

A Preliminary Taxonomic Review of the South American Bearded Saki Monkeys Genus *Chiropotes* (Cebidae, Platyrrhini), with the Description of a New Subspecies

Abstract

Monkeys known as bearded sakis, genus *Chiropotes*, subfamily Pitheciinae, family Cebidae, are confined to the Guianan and Amazonian regions of South America. The two allopatric species recognized are *Chiropotes albinasus* I. Geoffroy and Deville and *Chiropotes satanas* Hoffmannsegg, with subspecies *C. s. chiropotes* Humboldt, *C. s. utahicki* (new), and *C. s. satanas* Hoffmannsegg. Each taxon is described and compared, and its geographic range is plotted and mapped. [Key words: bearded sakis, *Chiropotes* taxonomy, *Chiropotes satanas utahicki*, new subspecies.]

I. Introduction

This taxonomic review of the genus *Chiropotes* is the fourth of a series of preliminary reports on the taxonomy of living New World monkeys of the family Cebidae and the second of the subfamily Pitheciinae (Hershkovitz, 1979, 1983, 1984). Other reports will follow as new forms of cebids are discovered or classifications are revised. The taxa under consideration are the nonprehensile-tailed cebids of the genera *Saimiri*, *Aotus*, *Calli- cebus*, *Pithecia*, *Chiropotes*, and *Cacajao* of volume 2 (in preparation) of *Living New World Monkeys* (cf. Hershkovitz, 1977).

Two species of bearded sakis are recognized in the present account of the genus *Chiropotes*. The first, *C. satanas*, is composed of three subspecies, one of which is described as new. The second, *C. albinasus*, is monotypic. The karyotype of only one of the four taxa is known, and precise limits of the geographic boundaries of the species and subspecies are still to be determined (figs. 1–2).

Some generic characters are given here for ori-

entation, but detailed morphological descriptions, comparisons with other genera, systematic arrangements, and general biological information are reserved for the second volume of *Living New World Monkeys*. In any event, for those who can make use of the information now, this account includes complete synonymies and annotated bibliographic references to virtually all original published accounts on bearded sakis.

Material and Abbreviations

A total of 212 specimens, nearly all skins with skulls and a few skeletons, were examined. The material is contained in the following North and South American institutions with their abbreviations used in the text. Specimens in European museums remain to be studied.

- AMNH = American Museum of Natural History
- FMNH = Field Museum of Natural History
- IEC = Instituto Evandro Chavez
- LACM = Los Angeles County Museum
- MNRJ = Museu Nacional, Rio de Janeiro
- MPEG = Museu Paraense Emilio Goeldi, Belém
- USNM = National Museum of Natural History, Washington, D.C.
- USPMZ = Museu de Zoologia, Universidade de São Paulo

II. Genus *Chiropotes* Lesson

Synoptic Synonymy

Pithecia, Illiger, 1811, Prodr. Syst. Mamm., p. 70—part, *Cebus satanas* Hoffmannsegg included. E. Geoffroy,

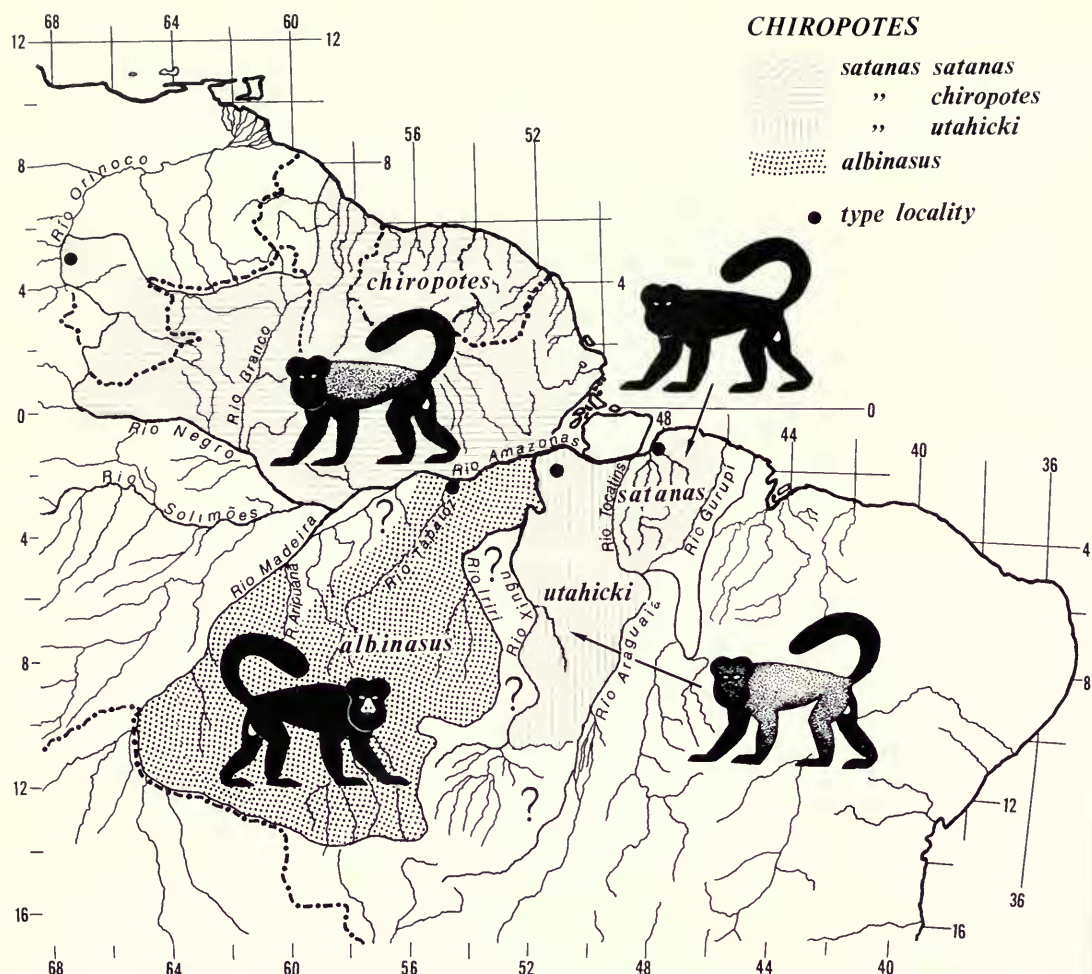


FIG. 1. Geographic range of each of the four presently recognized forms of bearded sakis; large parts of boundaries shown are unprecise or unknown.

1811, Ann. Mus. Hist. Nat., Paris, 19: 115—part, *satanas* Hoffmannsegg, *chiropotes* Humboldt included. Schlegel, 1876, Les Singes. Simiae, p. 215—part, *satanas*, *chiropotes*, *albinasa* included. Elliot, 1913, Review of the Primates, 1: 285—part, *albinasa*, *chiropotes*, *satanas* included. Cruz Lima, 1944, Mamíferos da Amazônia, I. Primates, Contrib. Mus. Paraense Emilio Goeldi, p. 79—part, *albinasa*, *chiropotes*, *satanas* included. Moynihan, 1976, The New World Primates, Princeton University Press, pp. 9, 66—*Chiropotes* a synonym.

Chiropotes Lesson, 1840, Species des mammifères: Bimanes et quadrumanes . . . , p. 178—subgenus of *Pithecia* Desmarest, 1804; included species, *Chiropotes couxiu* Lesson (= new name for *Cebus satanas* Hoffmannsegg), Variété A, *Simia chiropotes* Humboldt, Variété B, *Pithecia sagulata* Traill (= *Simia chiropotes* Humboldt), Variété C, *Brachyurus israelita* (= *Simia chiropotes* Humboldt). Gray, 1870 Cat. monkeys, lemurs, fruit-eating bats Brit. Mus., p. 60—genus; included species, *sagulata* Traill (= *chiropotes* Hum-

boldt), *satanas* Hoffmannsegg, *ater* Gray (= *satanas* Hoffmannsegg), *albinasa* I. Geoffroy and Deville. Pocock, 1925, Proc. Zool. Soc. London, 1925: 29—characters; comparisons; classification; included species, *satanas*, *albinasa*, *chiropotes* (designated type). Cabrera, 1958, Rev. Mus. Argentino Cienc. Nat. "Bernardino Rivadavia," 4(1): 146—included species, *albinasa*, *satanas* (with subspecies *satanas* and *chiropotes*; classification. Haines, 1958, Quart. Rev. Biol., 33(1): 15—zygodactyly. Carvalho, 1960, Arq. Zool., São Paulo (1958), 11(5): 125—subgenus of *Pithecia*; type *C. couxiu* Lesson [= *C. chiropotes satanas*]. Hill, 1960, Primates, 4(A): 212—anatomy; behavior; food; distribution; taxonomy; species, *satanas*, *chiropotes*, *albinasa*. Erikson, 1963, Symp. Zool. Soc. London, 10: 142—locomotion (climber). Brehme, 1965, Z. Morph. Anthropol., 56(3): 206—dermatoglyphics. Napier and Napier, 1967, A handbook of living primates, Academic Press, New York, pp. 4, 120, 385, 394, 401, 411–412—classification; distribution, characters; locomotion, limb proportions; hand

[illegible]

FIG. 2. Localities (numbered dots) of bearded sakis collected or recorded in the literature. See corresponding numbers in gazetteer (p. 30) for locality, names, and available collector data.

indices; longevity; weights [data based on 1 or few specimens without identification of species]. Hershkovitz, 1972, *Int. Zoo Yearb.*, **12**: 5—classification; adaptations. Thorington, 1972, *Int. Zoo Yearb.*, **12**: 19—U.S. imports (1968–1969); use in research; living and born in zoos. Kuntz and Myers, 1972, *Int. Zoo Yearb.*, **12**: 62–65—ecto- and endoparasites. de Boer, 1974, *Genen Phaenen*, **17**(1–2): 52, 54—cytotaxonomy. Deane, 1976, First inter-American conference on conservation and utilization of American nonhuman primates in biomedical research, Pan American Health Org., Sci. Publ. no. 317: 146—simian malaria (*Plasmodium brasilianum* in *C. albinasus* and *C. satanas chiropotes*). Thorington, 1976, First inter-American conference on conservation and utilization of American nonhuman primates in biomedical research, Pan American Health Org., Sci. Publ. no. 317: 146—species. Hershkovitz, 1977, *Living New World Monkeys* (Platyrrhini), **1**: 10, 61, 73, 150–151, 170, 183, 352, 354, 361–362, 368, 374, 379, 381, 383, 386–391, 418, 428, fig. IV.6 (postorbital closure), fig. IV.65 (middle ear cavity), fig. IV.69 (auditory ossicles), figs. IV.78, 79 (mandible), fig. IV, 115 (skull, teeth), fig. VI.10 (endocranial cerebral impressions)—classification; locomotion; limb ratios; cranial anatomy; cerebral hemispheres; parasites. Szalay and Delson, 1979, *Evolutionary history of the primates*, Academic Press, p. 290—classification, subtribe Pitheciina, tribe Pitheciini, subfamily Pitheciinae, family Atelidae; type species *Chiropotes satanas* Hoffmannsegg. Bodini, 1980, *Acta biol. Venezuelica*, **10**: 419—VENEZUELA; function of hip joint muscles. Baba, Darga, and Goodman, 1980, in *Evolutionary biology of the New World monkeys and continental drift*, Ciochon and Chiarelli, eds., Plenum Press, pp. 426–427—biochemical analyses of phylogenetic relationships. Cartmill, 1980, in *Evolutionary biology of the New World monkeys and continental drift*, Ciochon and Chiarelli, eds., Plenum Press, p. 249—postorbital septum. Falk, 1980, in *Evolutionary biology of the New World monkeys and continental drift*, Ciochon and Chiarelli, eds., Plenum Press, pp. 276, 280 (sulcal pattern)—endocranial cast. Ford, 1980, in *Evolutionary biology of the New World monkeys and continental drift*, Ciochon and Chiarelli, eds., Plenum Press, p. 325—phylogenetic state of femur. Van Roosmalen, Mittermeier, and Milton, 1981, p. 419, in *Ecology and behavior of neotropical primates*, A. Coimbra-Filho and R. Mittermeier, eds., Academia Brasileira de Ciências, Rio de Janeiro—species; distribution; characters; behavior. German, 1981, *Amer. J. Phys. Anthropol.*, **54**: 224 (abstract)—functional morphology of tail. Conroy, 1981, *Amer. J. Phys. Anthropol.*, **55**: 192—asymmetry in jugular foramen. Ashton, Flinn, Moore, Oxnard, and Spence, 1981, *Trans. Zool. Soc. London*, **31**(1): 17, 44, 46, 48, 51, 53, 57, 65, 69, 70—pelvic morphometrics; locomotion. Conroy, 1982, *Amer. J. Phys. Anthropol.*, **57**: 7—significance of emissary foramina in intergeneric relationships. Sarmiento, 1983, *Int. J. Primat.*, **4**(2): 127—functional morphology of heel process. Rylands and Mittermeier, 1983, *Oryx*, **17**: 83—BRAZIL: Amazonian region (distribution in national parks and reserves).

Brachyurus Spix, 1823, *Sim. et Vesp. Brasil.*, p. 11—included species *israelita* Spix (= *Chiropotes satanas chiropotes* Humboldt), *ouakary* Spix (= *Cacajao me-*

lanocephala Humboldt); generic name preoccupied by *Brachyurus* Fischer, 1813, a genus of rodents [type species of *Brachyurus* Spix without original designation or subsequent selection, now *B. ouakary* Spix (= *Cacajao melanocephala* Humboldt)].

Pithæcia Temminck, 1827, *Monogr. Mamm.* **1**:—misspelling of *Pithecia* in combination *Pithæcia satanas* [= *Chiropotes satanas*].

Brachyurus Gray 1849, *Proc. Zool. Soc. London* **1849**: 9—type species *Cebus satanas* Hoffmannsegg by original designation and monotypy; generic name preoccupied by *Brachyurus* Fischer 1813, a genus of rodents, and *Brachyurus* Spix (= *Cacajao* Lesson, 1840), a genus of cebid primates).

Chiropotes Reichenbach, 1862, *Vollst. Naturg. Affen*, p. 72—emendation of *Chiropotes* Lesson; name raised to generic rank; included species, *satanas* Hoffmannsegg, *israelita* Spix (= *chiropotes* Humboldt), *sagulata* Traill (= *chiropotes* Humboldt).

Saki Schlegel, 1876, *Les Singes*, Simiae, p. 225—in combination *Saki satanas* attributed to “Is. Geoffroy, Catal., p. 56” where “*S. satanas*” is a typographic error for *P[ithecia]. satanas* (cf. I. Geoffroy, 1851, *Cat. Coll. Mamm. Mus. Hist. Nat.*, Paris, p. 91, Errata).

TYPE SPECIES—*Pithecia* (*Chiropotes*) *couxio* Variété A Lesson with synonym *Simia chiropotes* Humboldt = *Chiropotes satanas chiropotes* Humboldt, by *absolute tautonomy* (Art. 68 (d), International Code of Zoological Nomenclature) 1964, p. 67.

Distribution (Figures 1–2)

Tropical forests of the Guianan and Amazonian regions as follows: Guyana exclusive of its northwestern third, Suriname, French Guiana; in Venezuela, the upper Río Orinoco and Río Negro basins in the state of Amazonas; in Brazil, the north bank of the Río Amazonas from the Río Negro east to the coast, the south bank of the Río Amazonas and Río Pará from above the junction of the Río Madeira and Río Aripuanã east to the boundary area between the states of Pará and Maranhão (Río Gurupí) and possibly beyond into the coastal forests of Maranhão as far as Baía de San Marcos and the Río Pindaré.

Large gaps in the Brazilian part of the range where bearded sakis may occur include the vast region between the Rios Iriri and Xingu and the well-trafficked and collected east bank of the Río Madeira below the mouth of the Aripuanã. Southern limits of the range are unknown, but presumably extend to or near the divide between the Amazonian and Paraná watersheds.

Chiropotes is unknown in the state of Goiás and probably does not occur there. It is absent in the Ilha de Marajó, the savannas of Brazil, all Colom-

bia, all Venezuela outside the state of Amazonas, all parts of the Amazonian region west of the Rios Negro and Madeira, the Andes and beyond.

The lower Rio Japurá region mentioned by Spix (1823, p. 12) as habitat of his *Brachyurus israelita* (= *Chiropotes satanas chiropotes*) is outside the geographic range of the genus. Tschudi's (1844, pp. 8–9, 23, 50) reference to the occurrence of *Chiropotes* in Peru under the name "*Pithecia satanas*" appears to be a confused report of a species of true *Pithecia*. Muckenhiem et al. (1976, p. 16a), who censused the monkeys of Guyana, questioned the presence of bearded sakis in the northwestern third of the country, but they (1976, p. 10a) indicate the range of the genus as extending beyond Guyana to the lower Río Orinoco in Venezuela.

Generic Name

The specific name *chiropotes* introduced by Humboldt for the Guianan bearded saki and which became the generic tautonym is the Greek word combination for "hand drinker." As described by Humboldt (1811, p. 313), the adult male bearded saki or *capucin* presented to him in San Tomás de la Angostura (now Ciudad Bolívar) and observed over a period of four months "drank infrequently but, most remarkably, not like the other American monkeys which bring their lips to the water. The *capucin* drank by scooping up the water in the hollow of his hand and carrying it to his mouth." Humboldt added that the animal drank only when alone and unobserved, using either hand for letting the water trickle into the corner of his mouth. This operation, Humboldt believed, kept the animal's beard dry. Porter (1834, p. 41) reports that a bearded saki he shipped to the London Zoo from Caracas "drinks frequently, always bending down on its hands, and putting its mouth to the surface of the water, heedless, apparently, of wetting its beard and indifferent to the observations of lookers-on." Porter "never saw it take up water in the hollow of its hand and carry it in this manner to its mouth in order to drink."

Platyrrhines certainly drink as described by Porter. I have also observed monkeys dip a hand into water out of mouth's reach and suck or lick the moisture from the soaked fur. Monkeys also eat solid food held in the palm of their hand.

Generic Characters

EXTERNAL (FIG. 3)—Size and proportions approximating those of untufted capuchin monkeys

(*Cebus*); lower half of nose broad, thick, the nares widely separated; tail non-prehensile, its length from slightly more to slightly less than combined head and body length; hairs with or without subterminal banding, generally short, thick, those of midback less than 5 cm long; face blackish (except rostrum of *C. albinasus*), the skin thinly covered with hair; dorsum orange or pale brown to blackish, slightly to strongly contrasting with darker extremities (head, limbs, tail), sides of trunk and underparts; anterior portion of coronal pelage arranged in paired bilaterally symmetrical pads or tufts radiating from vertex and becoming extremely bushy in old males; pelage of nape directed back, not whorled; beard well developed, the whiskers of each side meeting on midline of throat, hypertrophied in old males; tail bushy, foxlike, the hairs becoming longer distally; external genitalia mostly to entirely unpigmented, glans penis without baculum; clitoris not pendulous.

The thick coiffure and beard of *Chiropotes* is an elaboration or modification of what is seen in *Pithecia*. It also appears that slightly curled and silvery tipped dorsal pelage of *C. albinasus* simulates what may be an early evolutionary grade in the evolution of the long, thick, gray-tipped, curly pelage of some forms of *Pithecia*. The bushy foxlike tail of *Chiropotes*, irrespective of length, is characteristic of all pitheciines.

CRANIAL (FIGS. 4–7)—Premaxillae long, forward projecting; dorsal plane of nasals slightly concave or nearly straight, the combined nasals triangular in outline or funnel-shaped but not inflated distally, greatest combined width less than one-half distance across alveoli of canine teeth, tips evenly expanded, not inflated, border rounded or incised and not extending to plane of acanthion when perpendicular to Frankfurt plane; facial or nasal angle comparatively high (cf. Hershkovitz, 1977, p. 126); braincase well inflated, the lateral expansion greater than biorbital breadth, width to length usually more than 70%; frontal bone steeply vaulted, metopic suture often remaining partially distinct well into subadulthood; supraorbital ridges continuous with temporal ridges and rising above glabella to define a triangular frontal plate in old individuals; temporal ridges forming a sagittal crest in old males, often in old females; superior half of lateral orbital border approximately vertical to Frankfurt plane; median length of frontal bone (nasion to bregma) subequal to or, usually, less than median length of parietal bone; interpterygoid fossa usually shallow; mesopterygoid fossa comparatively narrow, distance between outer bases of hamular processes



FIG. 3. Guianan or golden-backed bearded saki (*Chiropotes satanas chiropotes*). New York Zoological Society Photo.



FIG. 4. *Chiropotes* and *Pithecia* skulls compared: front and side views.

subequal to or usually less than greatest distance between outer incisors; width of basioccipital-presphenoidal suture usually less than one-half median length of basioccipital bone; perpendicular plate of vomer well anterior to posterior border of palate, its wings behind narrowly spread, fully exposing uncrested presphenoid; anterior half of auditory bulla tapered to a blunt point; carotid foramen usually completely exposed to view on ventral surface; paraoccipital and mastoid processes well defined; nasoturbinal and ethmoturbinate I subequal in size; orbits well separated,

interorbital septum at level of ethmoid bone broad, pneumatized; foramen magnum pointing down about as much as back; angle of mandibular ascending ramus broadly expanded, condylar suspension elevated (Herskovitz, 1977, p. 191).

DENTAL—Dental formula, i_2^2 , c_1^1 , pm_3^3 , m_3^3 = 36; upper cheek teeth more or less parallel-sided, sometimes slightly divergent anteriorly, less frequently posteriorly; in upper tooth row, m^1 largest, pm^2 or m^3 smallest; in lower jaw, pm_2 usually as large and in males often larger than m_1 ; molars

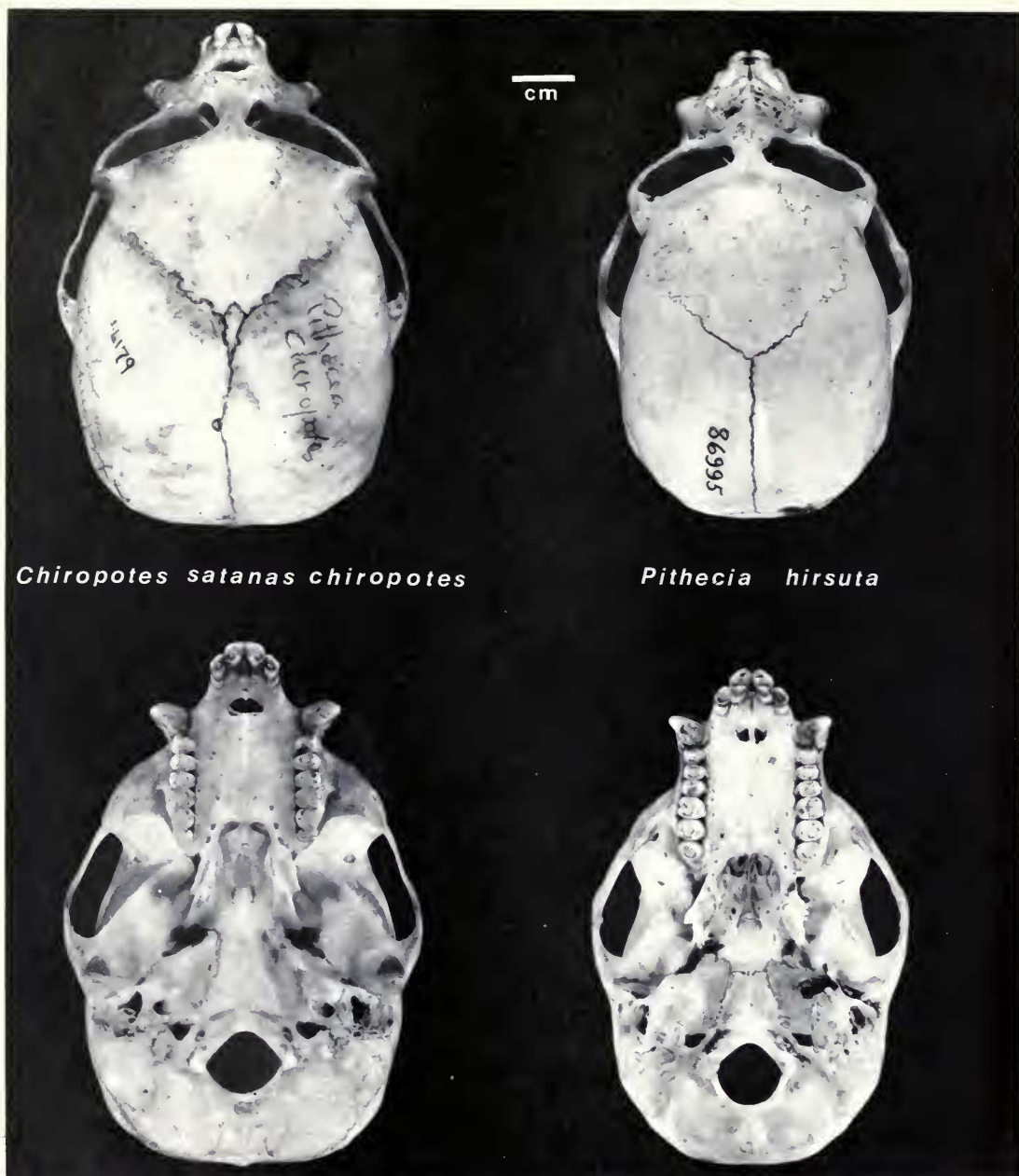


FIG. 5. *Chiropotes* and *Pithecia* skulls compared: dorsal and ventral views.

quadrilateral, about as long as wide, cusps low, cristas weak, the oblique absent, unworn enamel of occlusal surface wrinkled; canines extremely stout, not recurved but strongly divergent laterally, the upper with large diastema in front; incisors long, narrow, forward projecting, the outer slightly staggered behind inner, protocone well developed on inner incisor, less developed or lacking on out-

er; lower incisors lemurine or comblike, pincer-like in occlusion, combined width across unworn cutting edges less than height of I_2 .

Dental succession of permanent teeth, based on 8 juvenals:

m1, m2, pm2, pm3, pm4, i1, i2, m3, c
m1, m2, (pm2, pm3, pm4) or (i1, i2) m3, c

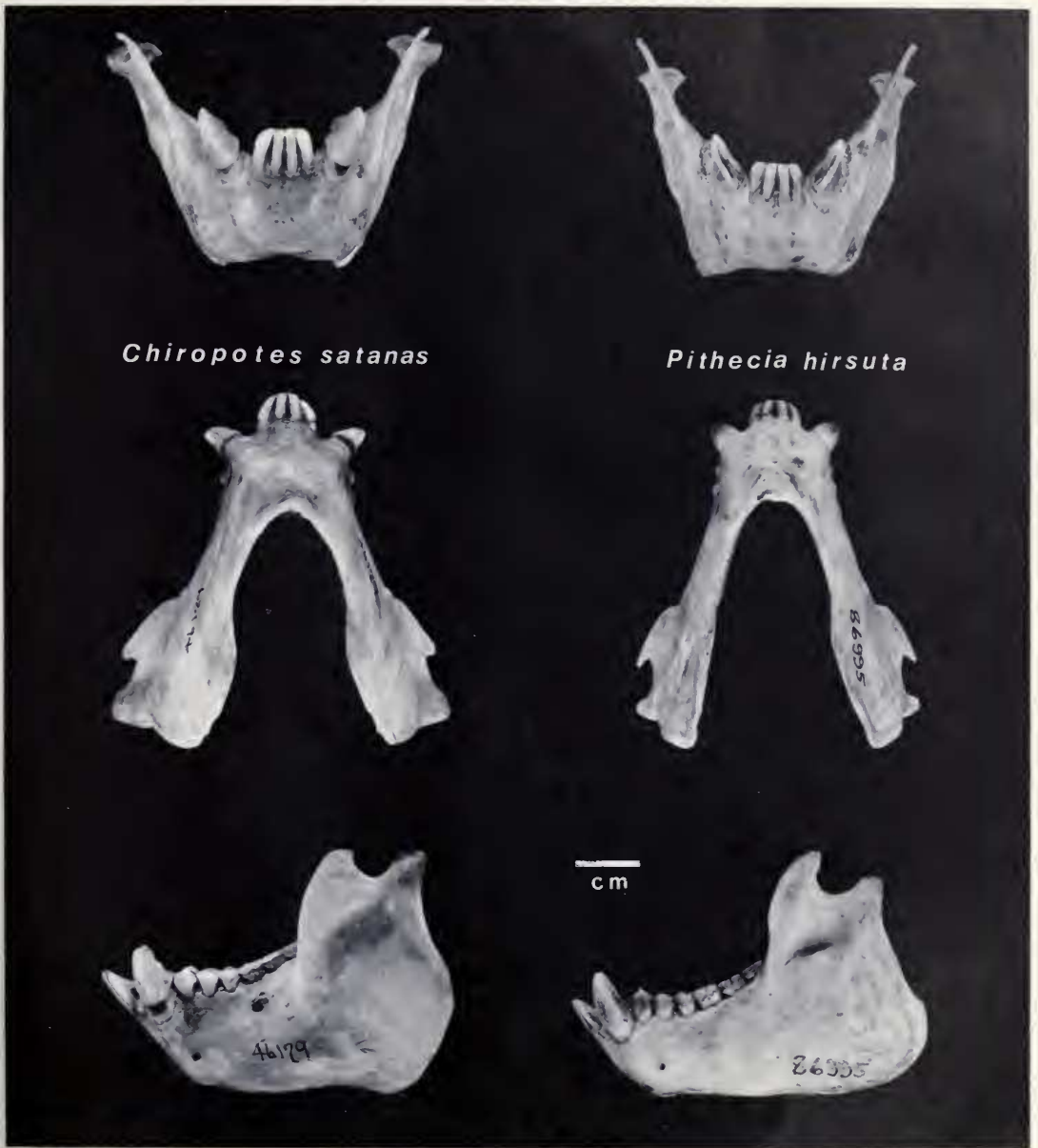


FIG. 6. *Chiropotes* and *Pithecia* mandibles compared: front, ventral, and side views.

Sequence of eruption of deciduous teeth, based on a single specimen: di (1, 2), dpm (2, 3), dpm 4.

Note—A captive red uacari (*Cacajao calvus rubicundus*) I observed in Iquitos, Peru, during December 1981, used its large canines for stripping woody cortex from canes, including sugar cane, and leaf stems to get at the sweet medulla. The dentition of *Chiropotes* is like that of *Cacajao*.

POSTCRANIAL SKELETON—The following parts are noteworthy; number of specimens examined, all in FMNH, is shown in parentheses.

Scapula—Incisura scapulae shallow to deep, but not partially to completely surrounded by bone (10 specimens).

Pelvis—Orientation of long axis of obturator foramen dorsoventral (5 specimens, both sides).

Vertebral Formula—Cervical, 7 (5); thoracic, 13

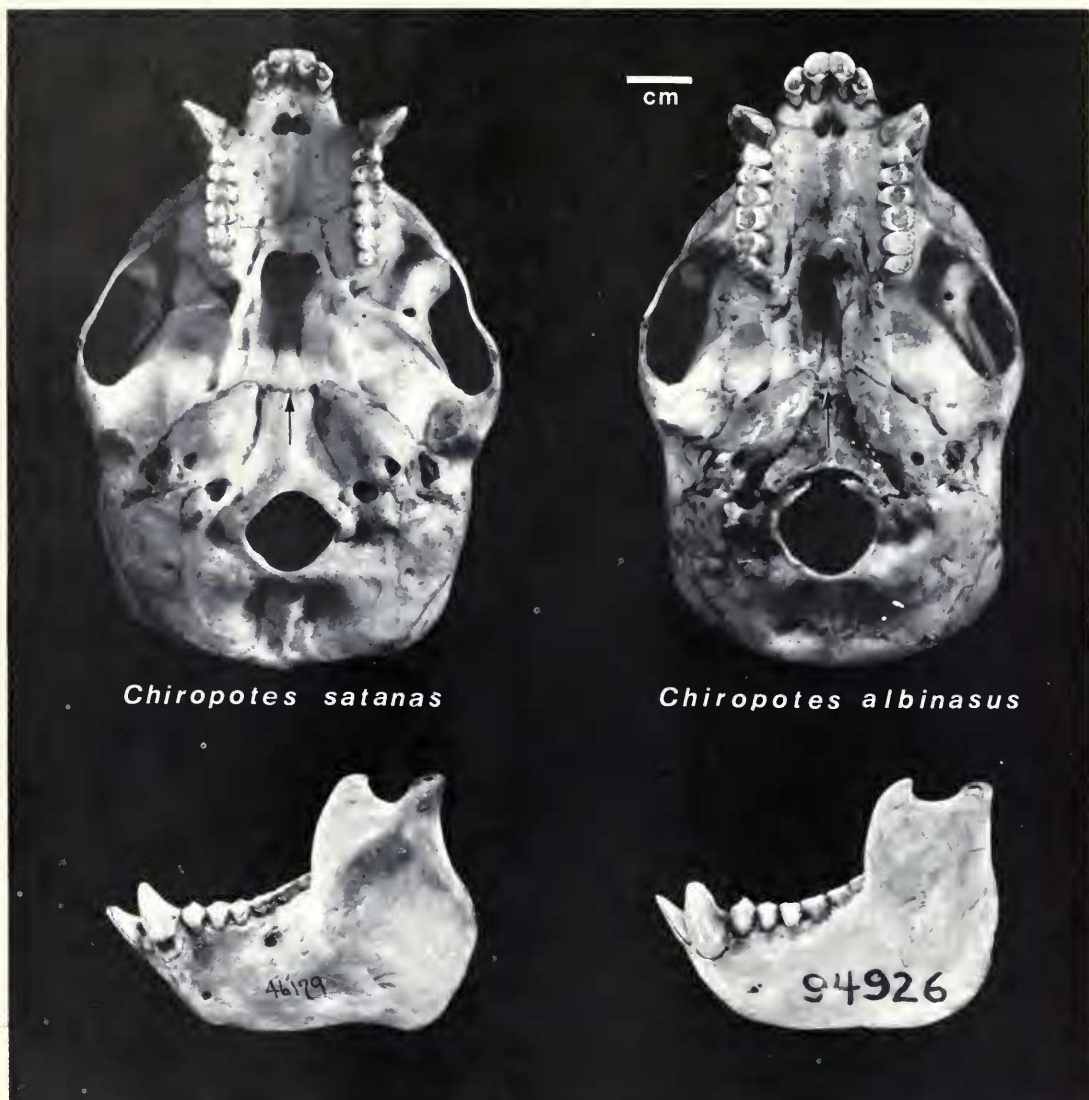


FIG. 7. *Chiropotes* skulls: basicrania showing distance between tympanic bullae measured across sphenoccipital suture (arrow) greater in *C. satanas* than in *C. albinasus*; mandible showing produced gonion and inferior border with notch defining angle in *C. satanas*, non-protruding gonion and inferior border without notch in *C. albinasus*.

(4), 14 (1); lumbar, 6 (5); sacral, 3 (5); caudal, 21 (1), 23 (3), 25 (1).

Caudal Vertebral Crests—Sagittal crest as extension of spinous process of caudal vertebrae 6 to 8, weakly defined or absent (5 specimens).

Entepicondylar Foramen—Present and completely surrounded by bone (10 specimens).

Third Trochanter—Barely indicated or virtually absent.

Long Limb Bone Ratios (see table 1)—Measure-

ment used in calculating ratios for limb bones is greatest length. Trunk length is the straight line between anterior border of first thoracic centrum to posterior border of last sacral centrum. Length of right and left limb bones are about the same, with differences usually favoring the right.

Five skeletons only of *Chiropotes satanas chiropotes* were at hand. The final report will include measurements and ratios of additional *Chiropotes*, including those of other pitheciines.

TABLE 1. Limb bone ratios (right/left) and pelvic indices in adult *Chiropotes satanas chiropotes*.*

FMNH no.	R/H	T/F	H + R/F + T	H + R/Tr	F + T/Tr	PSD/PID
93522 ♀	88/88	93/93	82/82	71/70	86/86	88
93255 ♂	—/85	92/91	—/82	—/77	94/94	86
95512 ♂	86/—	93/92	85/—	80/—	95/95	69
95518 ♂	88/88	91/91	82/82	78/78	96/95	95
95519 ♂	—/88	—/—	—/—	—/83	—/—	90

* F = femur; H = humerus; R = radius; T = tibia; Tr = trunk; PSD/PID = pelvic index (cf. Hershkovitz, 1977, pp. 426–427); PSD = pelvic superior diameter; PID = pelvic inferior diameter.

For information on postcranial skeletal ratios of related forms and bibliographic references, see Hershkovitz (1977, pp. 30–64, 425–430).

CYTOGENETIC—Hitherto published pitheciine chromosome numbers and morphologies are tabulated (table 2).

Systematic Position

Chiropotes is one of three genera that comprise the subfamily Pitheciinae, family Cebidae. Of the three, *Pithecia* is regarded as more primitive, *Cacajao* more derived. The intergeneric relationships have never been disputed, and treatment of the Pitheciinae as a subfamily of the Cebidae has been generally accepted. However, Rosenberger (1981, table 2, fig. 3, and relevant text) arguably believes pitheciines are more nearly related to spider monkeys (*Ateles*) than to capuchins (*Cebus*) and combines them with *Aotus*, *Callicebus*, *Alouatta*, *Lagothrix*, and *Brachyteles* to form the family Atelidae. There is little morphological support for this arrangement and much of it is ambiguous. For instance, one or more of the characters used by Rosenberger (1981, p. 22) for defining his restricted concept of the Cebidae are not common to all the

included genera. At the same time, one or more of the same characters are also common to some members of the Atelidae. However, discussions of systematics and phylogenies of pitheciines and related supergeneric groups are outside the scope of this report. They are properly included in the second volume of *Living New World Monkeys* (in preparation).

Sexual Dimorphism

Adult males are larger than females in body mass (table 3), but tail relative to combined head and body length averages slightly shorter (table 4); their erectile coronal tufts are longer, thicker, beard longer, fuller; cranially, marked by more pronounced supraorbital ridges, with sharper definition of frontal triangular eminence and sagittal crest; dentally, by slightly heavier, more splayed canines and larger lower first premolar (pm₂).

Supraorbital ridges and sagittal crest are usually absent in young males and adult females and never strongly developed in old females. The metopic suture tends to persist in young and does not fully disappear in subadults of both sexes.

TABLE 2. Known karyotypes of the Pitheciinae (Cebidae).

Name	N	Sex	2N	BiA	A	Hetero- morphic	X	Y	Selected references
<i>Chiropotes satanas chiropotes</i>	1	♀	54†	24	30	—	?	?	Boer, 1974, 1975
<i>Cacajao calvus calvus</i> *	2	♂♀	46	18	26	—	BiA	A	Benirschke et al., 1976
<i>Cacajao calvus rubicundus</i> *	2	♂♀	46	18	26	—	BiA	A	Benirschke et al., 1976
<i>Cacajao calvus rubicundus</i>	1	♀	45†, 46†	20	25, 26	—	?	?	Boer, 1974
<i>Cacajao calvus rubicundus</i>	1	♂	45	18	24	BiA, A	BiA	—‡	Dutrillaux et al., 1981
<i>Cacajao melanocephalus</i>	1	♂	45	18	24	2§	BiA	—	Koiffmann & Saldanha, 1981
<i>Pithecia pithecia</i>	2	♂♀	48	18	28	—	BiA	BiA	Boer, 1975

* Karyotypes of *calvus* and *rubicundus* said to be identical. † Includes unidentified sex chromosomes. ‡ Y chromosome translocated to an acrocentric autosome. § "One acrocentric and one subtelocentric."

III. Species and Subspecies of *Chiropotes* (Figure 1)

The two recognized species of *Chiropotes* are the monophyletic *C. albinasus* I. Geoffroy and De-ville, 1848, and *C. satanas* Hoffmannsegg, 1805, with three subspecies. Judged by uniformly taken cranial measurements (tables 5–9), *C. albinasus* averages slightly larger than *C. satanas chiropotes*, the largest race of its species. Next, in descending order of size, are *C. satanas satanas* and *C. s. utahicki*. Variably taken external measurements are not necessarily confirmative (tables 3–9), but the size differences are consistent in all measure-ments (compare tables 3, 4).

Chiropotes albinasus is further distinguished from *C. satanas* by its nearly uniformly blackish coat and conspicuous whitish or flesh-colored sub-triangular rostral patch that extends from between the eyes to at least middle half of upper lip, and sometimes to lower lip. The *C. albinasus* patch is adumbrated in *C. satanas* by the naked inverted Y-shaped rostral mark in juvenals and frequently unpigmented narial borders in adults.

Except for the rostral patch, pigmentation of the *C. albinasus* coat is eumelanin in varying concen-trations, with terminal half of individual hairs of dorsum paler, usually silvery buff, than the black-ish basal portion. In *C. satanas chiropotes*, ter-minal half of hairs of back, shoulders, and prox-imal portion of outer side of limbs are often agouti; that is, with the exposed portion of each hair char-acterized by alternating bands of blackish eumela-nin and reddish pheomelanin. Pelage of the re-maining three races of *C. satanas* is non-agouti, with exposed portion of hairs entirely eumelanin, the concealed or basal portions paler except on certain parts of body, particularly the tail, which may be pheomelanin. It is probable that in some cases, a pale brown or reddish brown color of non-agouti hairs interpreted as a tone of eumelanin has an admixture of pheomelanin granules.

Pelage in *C. albinasus* and *C. satanas* is parted along the middorsal line from forehead to tail tip, with the hairs curving away to each side at nearly right angles. The condition is most marked in *Chi-ropotes albinasus* and least evident in the dorsum of *C. satanas chiropotes*.

Coronal tufts and beard are more developed in *C. satanas* than in *C. albinasus* and thicker in males than in females.

Cranial differences between *albinasus* and *sata-nas* are slight and almost entirely restricted to the degree of approximation between the anterior por-tions of the tympanic bullae. The distance between

TABLE 3. Weights and combined head and body lengths of bearded sakis (*Chiropotes*) (means followed by extremes in parentheses and number of samples).

Taxon	Weights (g)	Head and body lengths (mm)
<i>albinasus</i>		
♂♂	3,148 (2,903–3,320) 7	400 (380–410) 7
♀♀	2,487 (2,220–2,720) 7	391 (375–410) 7
<i>chiropotes</i>		
♂♂	2,904 (2,200–4,000) 20	423 (370–507) 20
♀♀	2,583 (2,000–3,300) 19	413 (375–460) 19
<i>satanas</i>		
♂	2,510	390
♀	2,500	380

Sources: *C. albinasus*—Ayres (1981, table 10; 5 ♂♂, 5 ♀♀); USNM, 2 ♂♂, 2 ♀♀. *C. satanas chiropotes*—Ayres (1981, table 11, 16 ♂♂, 17 ♀♀); FMNH, 2 ♂♂, MPEG, 2 ♂♂, ♀; USNM, ♀. *C. satanas satanas*—MPEG, ♂, USNM, ♀.

them, measured across the spheno-occipital su-ture, is less in *C. albinasus* than in the slightly smaller *C. satanas chiropotes* (fig. 7), as shown by the following means, extremes (in parentheses), and sample numbers.

<i>C. s. chiropotes</i> :	<i>C. albinasus</i> :
7.9 (7.0–8.7) 8 ♂♂	6.2 (5.8–7.0) 7 ♂♂
7.0 (6.0–8.2) 10 ♀♀	5.5 (4.9–6.3) 8 ♀♀

The ratio of the distance across the spheno-oc-cipital suture to the condylobasal length of skull in specimens at hand of *C. albinasus* and all sub-species of *C. satanas* compares as follows.

<i>C. albinasus</i> :	<i>C. satanas</i> :
8.3% (8%–9%) 7 ♂♂	11% (9%–12%) 17 ♂♂
7.2% (6%–8%) 8 ♀♀	10% (9%–11%) 18 ♀♀

The significance of the cranial difference be-tween species and sexes is not apparent; it is un-related to differences in body mass. The same ratio in *Cacajao*, largest of pithecines, is nearer *Chi-ropotes satanas*, whereas that of *Pithecia*, the smallest pitheciine, is nearer *Chiropotes albinasus*, the largest of its genus.

Perhaps unrelated to the distance between the auditory bullae is the tendency, particularly in males, for the inferior mandibular border of *Chi-ropotes albinasus* to be straight, with little or no notch defining the angular process. In male *C. satanas*, the notch is usually well defined, the an-gular process more bulging, with gonion usually projecting beyond the condylo-basal axis. In male *C. albinasus*, the gonion often fails to project as far (fig. 7).

TABLE 4. Sexual dimorphism in body mass and ratio of tail length to head and body length in bearded sakis (*Chiropotes*) (means followed by extremes in parentheses and number of samples).

Name	Sex	Head and body length	Tail length	Tail length Head and body length	
<i>utahicki</i>	♂	390 (365–420) 6	387.5 (370–410) 6		99.4%
<i>utahicki</i>	♀	366 (358–370) 6	428.7 (368–575) 6		117.1%
<i>satanas</i>	♂	406 (380–424) 4	373.5 (359–390) 4		92%
<i>satanas</i>	♀	369 (335–388) 7	385.6 (370–400) 7		104%
<i>chiropotes</i>	♂	399.3 (362–459) 24	384.3 (300–463) 24		96.2%
<i>chiropotes</i>	♀	390.4 (327–460) 44	397.5 (340–450) 44		101.9%
<i>albinasus</i>	♂	427 (390–460) 8	416 (360–450) 8		98%
<i>albinasus</i>	♀	418 (360–511) 16	413.8 (355–480) 16		99%

Source: Measurements in Tables 6–9.

Key to Geographic Forms of Adult Bearded Sakis, Genus *Chiropotes*

- I. Face with nasal region and upper lip flesh-colored, the hairs whitish or yellowish, body hairs paler terminally than basally *C. albinasus* (p. 25)
- II. Face blackish, without large, conspicuous flesh-colored or whitish hairy patch; body hairs darker terminally than basally.
 - A. Dorsum dominantly blackish brown to blackish; outer side of upper arms and proximal part of outer side of thigh blackish *C. satanas satanas*
 - B. Dorsum dominantly orange or pale brown to dark brown; outer side of upper arms and proximal part of outer side of thighs orange to dark brown, not blackish.
 1. Head, nape, lower arms, and legs blackish, sharply contrasted with orange of dorsum; side of trunk orange to brown, with terminal half of hairs usually banded *C. satanas chiropotes*
 2. Head, nape, lower arms, and legs pale brown to dark brown and not sharply contrasted with brown of dorsum *C. satanas utahicki* (new subspecies)

Chiropotes satanas chiropotes Humboldt (figs. 3, 8)

Simia chiropotes Humboldt, 1811, Rec. Obs. zool. Anat. Comp., 1(1811): 311; (1812): 358.

Pithecia chiropotes, E. Geoffroy, 1812, Ann. Mus. Hist. Nat., 19: 116—characters; classification. Desmarest, 1819, Nouv. Dict. Hist. Nat., 30: 49—characters ex Humboldt. Kuhl, 1820, Beitr. Zool. Vergleich. Anat., 1: 43—characters; specimens in Paris Museum. Schomburgk, 1847, Reisen in British Guiana, 1: 351—GUYANA: *Essequibo* (Rupununi). Schlegel, 1876, Les Singes. Simiae, p. 223—FR. GUIANA: Oyapock; Cayenne; GUYANA: SURINAME; characters; synonyms, *israelita* Spix, *sagulata* Traill. Pelzeln, 1883, Verh. k. k. Zool.-Bot. Gesellsch., Wien, Beit., 33: 16—BRAZIL: *Roraima*; (Rio Branco); *Amazonas* (Cararaucu, Rio Amazonas); characters. Jentink, 1887, Cat. Ostéol. Mus. Pays-Bas, 9: 44—SURINAME; GUYANA; FR. GUIANA: (Cayenne; Oyapock); characters. Jentink, 1892, Cat. Syst. Mamm. Mus. Pays-Bas, 11: 50—GUYANA; FR. GUIANA: (Oyapock); SURINAME (from Lidth de Jeude Museum). Thomas, 1910, Ann. Mag. Nat. Hist., ser. 8, 6: 184—GUYANA: *Essequibo* (Supinaam River). Elliot, 1913, Review of the Primates, 1: 297—characters. Lönnberg, 1938, Ark. Zool.

Stockholm, 30(18): 21—BRAZIL: *Amazonas* (Igarapé Anibá, Rio Amazonas); *Roraima* (upper Rio Catrimani); characters. Tate, 1949, Bull. Amer. Mus. Nat. Hist., 76: 221—VENEZUELA: *Amazonas* (Cerro Duida); BRAZIL: *Pará* (Rio Jamundá near Obidos [= Rio Nhamundá near Faro]). Cruz Lima, 1944, Mamíferos da Amazônia, Primates, Contrib. Mus. Paraense, p. 95, pl. 10 (animal)—BRAZIL: *Amapá* (Rio Villa Nova); *Pará* (Rio Erepecurú; Rio Jari); characters. Carvalho, 1960, Arq. Zool. São Paulo, 11(5): 126—regarded as a subspecies of *P. satanas*.

C[ebus]. chiropotes, Fischer, 1829, Syn. Mamm., p. 57—classification.

Pithecia [sic] chiropotes chiropotes, Diaz-Ungria, 1965, Bol. Soc. Venezolana Cienc. Nat., 25(108): 393—VENEZUELA: *Amazonas* (Atures); nematode parasites.

Brachyurus chiropotes, E. Geoffroy, 1829, Cours de l'Histoire naturelle des mammifères, Leçon 10, p. 26—characters.

Chiropotes chiropotes, Pocock, 1925, Proc. Zool. Soc. London, 1925: 27, figs. 8c–d (skull)—characters; classification. Vieira, 1955, Arq. Zool. São Paulo, 8(11): 381—BRAZIL: *Amazonas* (Rio Negro; Rio Branco); *Pará* (Rio Jari); *Amapá*. Husson, 1957, Studies on the fauna of Suriname and other Guy-



FIG. 8. Adult male Guianan or golden-backed bearded saki (*Chiropotes satanas chiropotes* Humboldt). Photo from original in color, courtesy Cologne Zoo.

anas, 1: 20—SURINAME: (Nassau Mt.). Hill, 1960, Primates, 4(A): 222, fig. 46 (animal), pl. 15 (male and female)—distribution; characters. Fooden, 1964, Amer. J. Phys. Anthrop., 22(2): 227—SURINAME:

stomach content (fruit); gastro-intestinal proportions. Hick, 1963, Fr. Köln. Zoo, 6(3): 81, 3 figs. (animal)—2 females in Kölner Zoo received 1959, 1960; drinking water from hands (as per Humboldt

- account) not observed. Hick, 1963/64, *Int. Zoo Yearb.*, 5: 140—Köln Zoo; growth; acclimatization; diet. Hick, 1965, *Int. Zoo Yearb.*, 5: 140, fig. 4 (animal)—captive in Köln Zoo; age changes in male. Deane, Ferreira Neto, Cerqueira Almeida, 1968, *Rev. Inst. Med. Trop. São Paulo*, 10: 335—BRAZIL: Amazonas (Km 104–200, Manaus-Itacoatiara Road): plasmodial infection (*Plasmodium brasilianum*). Deane, Ferreira Neto, Okumura, Ferreira, 1969, *Rev. Inst. Med. Trop.*, São Paulo, 11 (2): 71—BRAZIL: Amazonas (*Plasmodium brasilianum* positive).
- C[hiropotes]. *chiropotes*, Miranda Ribeiro, 1940, *Mem. Inst. Oswaldo Cruz* (1940), 35(4): 808—BRAZIL: Roraima (Catrimani).
- Chiropotes satanas chiropotes*, Cabrera, 1958, *Rev. Mus. argentino Cienc. Nat. "Bernardino Rivadavia"*, 4(1): 146—classification. Avila Pires, 1964, *Bol. Mus. Paraense Emilio Goeldi, n.s. Zool.*, 42: 8, 12—BRAZIL: Amazonas (Praia do Cachorro, Rio Urubú). de Boer, 1974, *Genen Phaenen*, 17(1–2): 52—cytotaxonomy ($\varnothing 2n = 54$; 24 biarmed, 30 acrocentric). Deane, Batista, Ferreira Neto, and de Souza, 1970, *Rev. Inst. Med. Trop.*, São Paulo, 12(1)—BRAZIL: Amazonas (Km. 163 Highway Manaus-Itacoatiara): *Trypanosoma lambrechtii* infection. Husson, 1978, *Mammals of Suriname*, (Leiden), p. 209, pl. 43 (animal), pl. 51 (skull)—SURINAME: (Kaboeri Creek, Corantijn River; Stondansi Falls; Lombok Falls; Paris Jacob Creek; Lucie River; Kaiserberg airstrip; Sipaliwini airstrip; between Raleigh Falls and Voltsberg; Nassau Mts.; Upper Tapahony River); characters. Mittermeier and Van Roosmalen, 1981, *Folia Primat.*, 36: 1, fig. 1 (juv.).—SURINAME: Coppename (Raleighvallen-Voltzberg Nature Reserve, Coppename River); habitat utilization; diet. Mittermeier, 1981, in *Ecology and behavior of neotropical primates*, Coimbra-Filho and Mittermeier, eds., Acad. Brasil. Cienc. Rio de Janeiro, 1: 77, fig. 51 (juv.).—taxonomy. Van Roosmalen, Mittermeier, and Milton, 1981, in *Ecology and behavior of neotropical primates*, Coimbra-Filho and Mittermeier, eds., Acad. Brasil. Cienc., Rio de Janeiro, 1: 419, figs. 2, 6–7 (animal)—SURINAME; habitat; food; behavior; reproduction. Ayres, 1981, *Observações sobre a ecologia e o comportamento dos cúxius (Chiropotes albinasus e Chiropotes satanas, Cebidae: Primates)*. Instituto Nacional de Pesquisas de Amazônia (INPA), Manaus—distribution (locality data for specimens in AMNH, BM(NH), FMNH, IEC, MNRJ, MZUSP; Dimona; Fazenda Esteio; Reserva do INPA; Tirios; Rio Toototobi); characters, habits; food; ecology; comparisons with *C. albinasus*. Mittermeier and Van Roosmalen, 1982, *Int. Zoo Yearb.*, 22: 62, 64—SURINAME (interior savannah belt, old coastal plain); habitat; most heavily hunted apart from *Ateles*; diet; vulnerable species. Ayres and Nessimian, 1982, *Primates*, 23(3): 458—BRAZIL: Pará (Rio Nhamundá, left bank); stomach contents (insects, seeds, plants).
- Chiropotes [satanas]. chiropotes*, Hick, 1973, *Z. Köln. Zoo*, 16(4): 142, fig. p. 139 (animal, "Ringo")—in Köln Zoo.
- C[hiropotes]. *satanas chiropotes*, Hernández Camacho and Cooper, 1976, in *Neotropical primates*; Field studies and conservation; Thorington and Heltné, eds., *Nat. Acad. Sci.*, Washington, p. 67—VENEZUELA: Amazonas (Pitado, Rio Orinoco); questionably present in Colombia.
- Pithecia satanas chiropotes* Carvalho, 1961, *Rev. Biol. Trop.*, 9(1): 6—BRAZIL: Roraima (Poção; Caracará; Tuapara, Rio Mucajaí); habits. Carvalho, 1962, *Papeis Avulsos, São Paulo*, 15(21): 287—BRAZIL: Amapá (Rio Vila Nova, Macapá).
- [*Pithecia*] (*Chiropotes*) *couxio* Variété A, Lesson, 1840, *Species des mammifères: Bimanes et Quadrumanes*, p. 180—classification; characters; *Simia chiropotes* Humboldt a synonym.
- Simia sagulata* Traill, 1821, *Mem. Wernerian Soc.*, 3: 16, pl. 9 (animal)—GUYANA: (type locality, "interior of the colony of Demerara [= GUYANA]"); syntypes, "five different specimens brought to this country in 1817, by . . . Charles Edmonston, Esq." Napier, 1976, *Cat. Primates Brit. Mus. (Nat. Hist.)*, 1: 74—GUYANA: 2 syntypes, adult male, skin and skull, BM 47b; adult male, skin and skull, BM 47c (animal figured by Traill, 1821, pl. 9).
- Pithecia sagulata*, Desmarest, 1827, *Dict. Sci. Nat.*, Paris, 47: 45—similar to *P. satanas*. Lesson, 1827, *Manuel Mamm.*, p. 59—GUYANA (Demerara). Desmarest, 1827, *Dict. Sci. Nat.*, 47: 45—same as *chiropotes*. Porter, 1834, *Proc. Zool. Soc. London*, 1834, p. 41—VENEZUELA: Amazonas (Rio Orinoco near Rio Negro); habits; water drinking.
- C[ebus]. *sagulata*, Fischer, 1829, *Syn. Mamm.*, p. 56—classification.
- Ch[eiropotes]. *sagulata*, Reichenbach, 1862, *Vollst. Naturg. Affen*, p. 74, figs. 184–186 (animals)—characters; classification.
- Chiropotes sagulata*, Gray, 1870, *Cat. monkeys, lemons, fruit-eating bats Brit. Mus.*, p. 60—specimen [type?] in British Museum; synonyms, *chiropotes* Humboldt, *Brachyurus satanas* Gray, 1843 (not Hoffmannsegg).
- [*Pithecia*] (*Chiropotes*) *couxio* Variété B, Lesson, 1840, *Species des mammifères: Bimanes et quadrumanes* . . . , p. 180—classification; characters; *Pithecia sagulata* Traill a synonym.
- Brachyurus Israelita* Spix, 1823, *Sim. et Vesp. Brasil.*, p. 11, pl. 7 (animal)—BRAZIL: Amazonas (type locality, Rio Negro [p. 11], Rio Japurá [p. 12]; type, animal figured, Munich Museum, collected by the J. B. von Spix and C. F. Ph. von Martius Expedition between 1817 and 1820. Temminck, 1827, *Monogr. Mamm.*, 1: xv—regarded as young *Pithacia [sic] satanas*. Wagner, 1833, *Isis von Oken*, 10: 992—characters ex type; coloring of original figure bad; regarded as a synonym of *satanas*. Wagner, 1837, *Abh. Akad. Wiss. München*, 2: 438, pl. 2, figs. 2–3 (skull)—cranial characters. Elliot, 1913, *Rev. Primates*, 1: 298—synonym of *chiropotes*.
- [*Pithecia*]. *Israelita*, Wagner, 1840, *Schreber's Säugth.*, Suppl., 1: 219 and footnote, pl. 32B (animal)—characters of type; synonyms, *chiropotes*, *sagulata*.
- Pithecia Israelita*, Wagner, 1848, *Abh. Akad. Wiss. München*, 5: 433—part, BRAZIL: Roraima (foot Mt. Arimani); regarded as a variety of *satanas*. Cornalia, in *Osculati*, 1850, *Explor. Reg. Equator*, p. 301—BRAZIL: Amazonas (Rio Negro).
- Ch[eiropotes]. [*sic*] *Israelita*, Reichenbach, 1862, *Vollst. Naturg. Affen*, p. 73, fig. 183 (animal)—characters.

- [*Pithecia*] (*Chiropotes*) *couxio* Variété C, Lesson, 1840, Species des mammifères; Bimanes et quadrumanes . . . , p. 180—classification; characters; *Brachyurus israelita* Spix a synonym.
- [*Pithecia*] *satanas* Var. *fulvo-fusca* Trouessart, 1897, Cat. Mamm., fasc. 1: 43—in synonymy of *Pithecia chiropotes*; name attributed to Hoffmannsegg, 1807. Elliot, 1913, Review of the Primates, 1: footnote p. 297—author of name presumably Trouessart and not Hoffmannsegg [cf. Wagner, 1855, Schreber's Säugth., Suppl., 5: 102, where *fulvo-fusca* is used as a descriptive key term, not as a Latin name for *Brachyurus israelita*]. Cabrera, 1958, Rev. Mus. Argentino Cienc. Nat. "Bernardino Rivadavia," 4(1): 147—name in synonymy of *chiropotes* Humboldt attributed to Wagner, 1855.
- Simia Satanas*, Martius, 1831, in Spix and Martius, Reise in Brasilien (München), 3: 1131—BRAZIL: Amazônia; *Brachyurus Israelita* Spix a synonym.
- Pithecia satanas*, Wagner, 1837, Abh. Akad. Wiss. München, 2: 438, pl. 2, figs. 2–3 (skull)—cranial characters; *Brachyurus Israelita* Spix a synonym. Sclater, 1871, Proc. Zool. Soc. London, 1871: 228—part, GUYANA. Sousa, in Pelzeln, 1883, Verh. K. K. Zool.-Bot. Gesellsch., Wien, Beih., 33: 137—specimen figured by Ferreira, 1783, originally in Lisbon Museum, accessioned 1808 in Paris Museum. Peberdy, 1939, Report Br. Guiana Mus., 1936–1939, p. 29—GUYANA: *Essequibo* (Potaro).
- [*Pithecia satanas*], Cabanis and Schomburgk, 1848, Reisen Br. Guiana, 3: 771—GUYANA: *Essequibo* (Rupununi); habits. Wagner, 1855, Schreber's Säugthiere, Suppl., 5: 102—part, variety *fulvo fusca* [a descriptive phrase, not a technical name] for *Brachyurus israelita*.
- Pithecia Satanas*, Kappler, 1888, Pop. Sci. Monthly, 32(3): 398—SURINAME: (mountainous interior; Maroni River) external characters; behavior; local name hiu.
- Brachyurus Satanas*, Gray, 1843, List Mamm. Brit. Mus., p. 13—part, GUYANA, only; part synonyms (*sagulata* Traill, *israelita* Spix).
- Saki satanas*, Schlegel, 1876, Les singes. Simiae, p. 223—in synonymy of *Pithecia chiropotes*; citation of "S." *satanas* I. Geoffroy, Cat. Primates Mus. Hist. Nat., Paris, p. 56, a *lapsus* for *P[ithecia]*. cf. op. cit., p. 91.
- "S." *satanas*, I. Geoffroy, 1851, Cat. Primates Mus. Hist. Nat., Paris, pp. 56, 91—part, specimens 1 and 2; "S." a *lapsus* for "*P[ithecia]*."
- Chiropotes Satanas*, Gray, 1870, Cat. monkeys, lemurs, fruit-eating bats Brit. Mus., p. 61—BRAZIL.
- Chiropotes satanas*, Muckenhirn, Mortensen, Vessey, Fraser, and Singh (not Hoffmannsegg), 1975, Report on a primate survey in Guyana, Pan American Health Organization Nat. Acad. Sci., p. 12—GUYANA: *Berbice* (Waruni River; Wikki River); *Apoteri* (Rupununi River, Pakani; Essequibo River; Reiva River); census; group size, density; commerce; conservation. Napier, 1976, Cat. Primates Brit. Mus. (Nat. Hist.), 1: 74—part, BRAZIL; *Roraima* (Serra do Pacu); GUYANA: (interior of Demerara; Macusi district; Moraballi, 50 ft; Essequibo River; Supinaam River; Potaro River, 100 ft). Chiarelli, 1980, in Evolutionary Biology of the New World Monkeys and Continental Drift, Plenum Press, New York, Ciochon and Chiarelli, eds., pp. 389–390, 395—Karyotype: $2n = 54$ (24 biarmed, 30 acrocentric), FN = 78. Mittermeier, Van Roosmalen, and Fleagle, 1980, Amer. J. Phys. Anthropol., 52: 259 (abstract)—seed predation. Ayres and Milton, 1981, Bol. Mus. Paraense Emilio Goeldi Zool. No. 111—BRAZIL: Amazonas (SUFRAMA [Distrito Agrapécuário], Rio Cuieiras, north of Manaus); habitat. Hershkovitz, 1981, Folia Primat., 35: 189 (dental measurements), fig. 8 (pm₄, dpm₄, m₁)—comparison of lower last premolar and first molar. Smith, 1981, Amer. J. Phys. Anthropol., 55: 323—definition of variables of dental allometry in females. Smith, 1981, J. Human Evol., 10: 165—correlation of female maxillary canines with social structure, diet. Smith, 1981, Amer. J. Phys. Anthropol., 55: 323—definition of dental allometry in females. Rudran and Eisenberg, 1982, Int. Zoo Yearb., 22: 53–54—VENEZUELA distribution ("Guyana highlands, Amazon lowlands"). Sarmiento, 1983, Int. J. Primat., 4(2): 129—functional morphology of heel process. Smith, 1983, J. Morphol., 177: 59—articular surface of female mandibular condyle related to size of muscles, teeth, diet, mastication. Smith, 1983, Amer. J. Phys. Anthropol., 61: 315—female mandibular corpus correlation with diet, species size, shape (negative). Smith, 1983, J. Morphol., 177: 59—articular surface female mandibular condyle related to size of muscles, teeth, diet, mastication.
- Chiropotes chiropotes* ♂ × *Chiropotes albinasa* ♀, Hick, 1968, Fr. Köln. Zoo, 11(2): 34–35—front cover and illustrations of hybrid young with mother; mother; father; hybrid born 19 April 1968 in Kölner Zoo; rearing, growth, development, behavior.

TYPE—None preserved, name and description based on live individual presented to Humboldt as a gift from a Venezuelan resident in San Tomás de la Angostura (= Ciudad Bolívar). It was shipped to the menagerie of the Jardin des Plantes in Paris, but never arrived.

TYPE LOCALITY—Said to be the upper Río Orinoco south of the cataracts, Amazonas, Venezuela.

DISTRIBUTION—The Guianan region, in Brazil between the Rios Amazonas and Negro in the States of Amapá, Pará, and Amazonas, in Venezuela, east of the Río Orinoco in the State of Amazonas; Guyana, Suriname, and French Guiana. Contrary to Spix (1823, p. 12), bearded sakis do not occur along the lower Río Japurá or anywhere west of the Río Negro.

DIAGNOSTIC CHARACTERS—Sharp contrast between orange or ochraceous dorsum and mostly blackish extremities, part or all of back and sides of trunk with terminal half of hairs usually banded.

COLORATION—Dorsum buffy to orange sharply contrasted with blackish head, limbs, tail, lateral fringe, and underparts; hairs of mid-dorsum orange with brown tips, and usually with one or two

brownish subterminal bands alternating with orange bands; hairs of shoulders and sides of trunk more saturate, the agouti pattern more pronounced (cf. Hershkovitz, 1977, fig. p. 92); hairs of cheiridia blackish like arms and legs or mixed blackish and reddish to nearly or entirely reddish and contrasting with arms or legs; tail blackish, hairs entirely blackish or with brown (eumelanin) or orange (pheomelanin) bases; beard, as usual, longer and fuller in males than females, increasing in length with age, hairs blackish with paler bases; coronal pelage radiating from vertex and mid-frontal part.

Infant with dorsum dark brown, head, limbs, tail, underparts blackish, hairs uniformly dark brown or blackish with those of back drab basally; coronal pelage radiating from vertex short, beard undefined, facial skin entirely pigmented; pelage of one-third grown juvenal long, lax, distinct from that of infant and adult, coloration as in adult with sharp contrast between blackish extremities and paler back and sides; hairs of back mixed blackish, reddish, and agouti; coronal pelage as in young adult females; beard defined but thin, facial skin blackish, but lips, circumnarial region, and tip of nose thinly pigmented or unpigmented.

MEASUREMENTS—See Table 6.

VARIATION—The Guianan bearded saki is the only form of the genus with the agouti pattern retained in large areas of the coat. It is nearly consistently present on flanks and shoulders, but is present or absent on back and other parts of the body. An agouti patch on the right cheek of FMNH 95512 (Loksie Hattie, Suriname) is probably atavistic. As a rule, adults with dorsum agouti appear darker than those with hairs of back mostly to entirely unbanded. All types of chromatic variation are fully intergrading and may occur in the same population. Geographic variation is not evident.

SPECIMENS EXAMINED—Total 118. **BRAZIL.** Amazonas: Anibá, Igarapé, 2 (FMNH; USPMZ); Atabani, Rio, 6 (USPMZ); Castanhal, Faro, 5 (AMNH); Km 46, Manaus-Itacoatiara, 1 (MPEG); Km 48, Manaus-Itacoatiara, 2 (MPEG); Km 134, Manaus-Itacoatiara, 1 (MPEG); Km 165, Manaus-Itacoatiara, 8 (MPEG); Km 170, Manaus-Itacoatiara, 5 (MPEG); Km 175, Manaus-Itacoatiara, 1 (MPEG); Km 190, Manaus-Itacoatiara, 7 (MPEG); Km 200, Manaus-Itacoatiara, 3 (MPEG); Manaus-Itacoatiara, Estrada, 2 (MPEG); Paratucu, Rio, mouth, 1 (AMNH); Praia de Cachorro, Rio Urubú, 1 (MPEG); Rio Negro, Hacienda, Manaus, 1 (AMNH); San José, Faro, 4 (AMNH);

Serpa, Lago do, 1 (USPMZ); Silves, 1 (USPMZ); Urubú, Rio, 3 (USPMZ); **Pará:** Cachoeira do Tronco, Rio Erepecurú, 6 (MPEG); **Roraima** Agua Boa, Igarapé, Rio Mucajaí, 2 (USPMZ); Boa Vista, Rio Mucajaí, 1 (MPEG); “Bem Querer,” Rio Branco, 1 (FMNH); Caracará, Rio Mucajaí, 2 (MPEG); Catrimani, Rio, 2 (MPEG); Faro, 3 (AMNH); Mucajaí, Rio, Margem Norte, 1 (USPMZ). **GUYANA.** Essequibo River, 3 (FMNH); Kuitaro River, Rupununi, 4 (USNM); Wopsiana Island, 1 (USNM). **SURINAME.** Kaiserberg Airstrip, 2 (FMNH); Loksie Hattie, Saramaca River, 2 (FMNH); Palomeu Camp, Tapanoni River, 5 (FMNH); West River, Wilhelmina Mts., 2 (FMNH). **VENEZUELA:** Amazonas: Belén, 13 (USNM); Caño Caurima, 2 (USNM); Cunucunú, Río, 2 (USNM); Foothills Camp, Cerro Duida, 1 (AMNH); Mavaca, Río, 5 (USNM); Morganito, 1 (USNM); Pitado, 1 (AMNH); San Fernando, Río Orinoco, 30 km above, 1 (AMNH).

***Chiropotes satanas utahicki*, new subspecies** (figs. 9–13)

Pithecia satanas satanas, Carvalho (not Hoffmanns-egg), 1960, Arq. Zool., São Paulo (1958), 11(5): 125—**BRAZIL:** Pará (Rio Pracopi; Posto Indígena Atracão Gorotire, Gradaús, Rio Fresco); coloration.

Chiropotes satanas satanas, Ayres (part not Hoffmanns-egg), 1981, Observações sobre a ecologia e o comportamento dos cuxiús (*Chiropotes albinasus* e *Chiropotes satanas*, Cebidae: Primates, Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, p. 22—**BRAZIL:** Pará (Rio Pracopi, Portel; Portel; Fazenda Mineira, Itapiranga); Gradaús, Rio Fresco; Recreio, Rio Majary; Pedral, Baião; Rio Tocantins; Tapará, Rio Xingu).

HOLOTYPE—Young adult male, skin and skull, American Museum of Natural History no. 95865, collected 24 August 1931, by A. M. Olalla.

PARATOPOTYPES—Two adult females, skin and skull, AMNH 95867, skin only 95860; 1 adult male, skin and skull, FMNH 124543 (AMNH 95866).

TYPE LOCALITY—Tapará, right (E) bank Rio Xingu, near mouth, Pará, Brazil.

DISTRIBUTION—Lowlands between the Rios Xingu and Tocantins from the Rio Amazonas south to the Serra dos Carajás and Rio Itacaiuna.

DIAGNOSTIC CHARACTERS—Coat reddish brown to buffy, the extremities darker than dorsum but without sharp contrast; terminal half of hairs of dorsum and sides distinctly banded to not banded.

COMPARISONS—Distinguished from *Chiropotes satanas chiropotes* by dorsum dominantly brown-

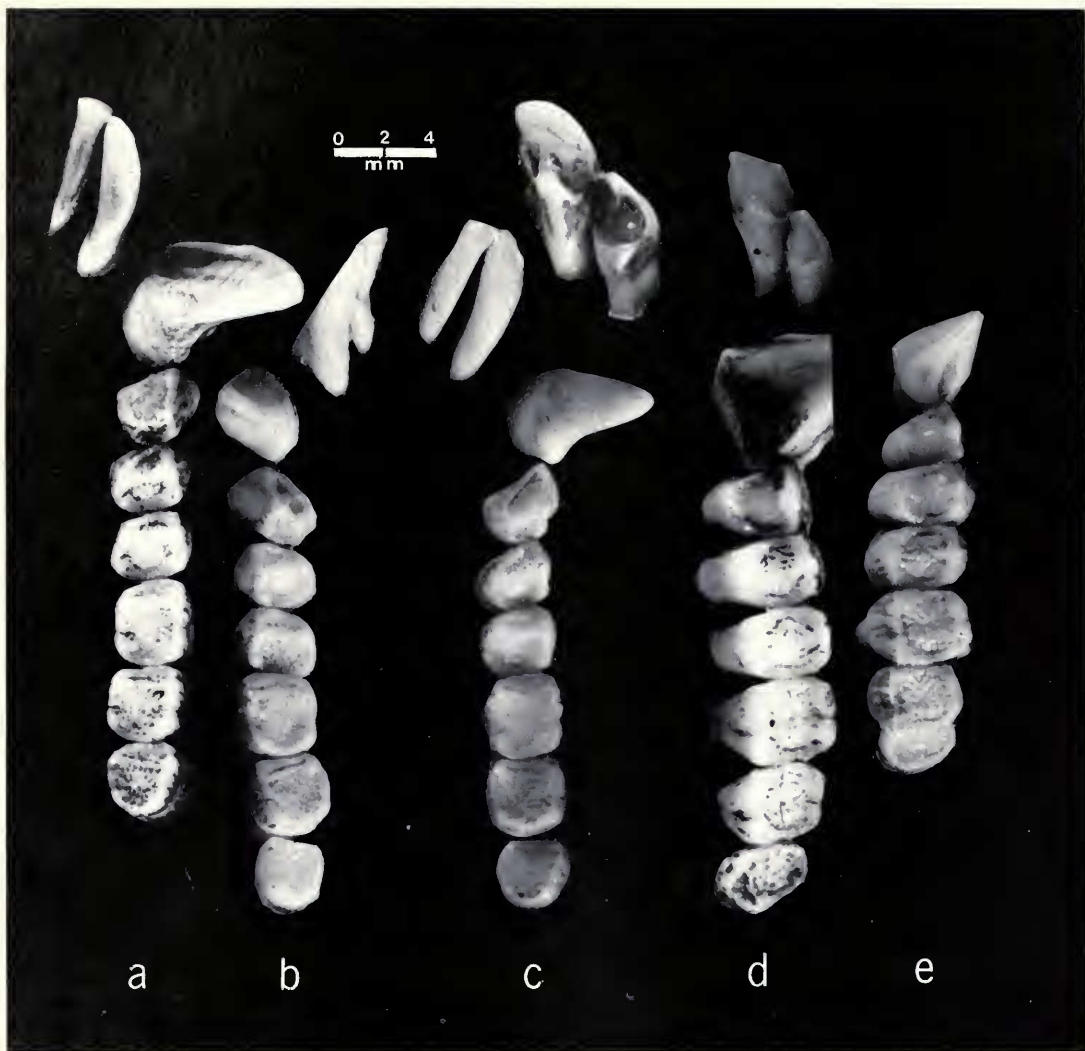


FIG. 9. Dentition, occlusal view, of female *Chiropotes satanas utahicki*: a, lower right (AMNH 95872); b, lower left (MPEG 6905) and c, lower right (MPEG 6905), with m_3 incompletely erupted; d, upper left (AMNH 95872); e, upper left (AMNH 95872).

ish not orange and not sharply contrasted with crown and limbs; from *C. s. satanas* by dominantly brownish not blackish dorsum and proximal portion of outer side of limbs.

COLORATION OF HOLOTYPE—Mid-dorsum and base of tail brown, hairs with basal half pale brown, grading to drab or gray toward the roots, subterminal portion darker brown, tips pale brown to nearly colorless; sides of trunk including fringe hairs, crown, and outer side of upper arms and thighs darker than dorsum, with subterminal and terminal portions of hairs uniformly brown, basal portion of hairs pale; beard, forearms, forelegs,

hands, and feet uniformly dark brown; bushy tail blackish brown superficially, the hidden basal portion of the hairs pale brown, becoming buffy or drab toward the roots; paired coronal tufts moderately developed and overhanging the brown, naked ears; eyelids and narial margins unpigmented, remainder of facial skin blackish and thinly covered with dark brown hair; scrotum unpigmented, whitish in life; underside of trunk and inner sides of limbs thinly haired brown, the pale skin showing through.

MEASUREMENTS—See Table 7.

VARIATION—A male and two female parato-



FIG. 10. Adult male Uta's bearded saki, *Chiropotes satanas utahicki*, two views. The light snout is caused by reflected sunlight. For a color photograph of the same animal, see Ayres & Deutsch (1982, p. 76).

potypes, all young adults, closely resemble the holotype. The male (AMNH 95866) is practically indistinguishable, the dorsum of the two females appears slightly darker, the tips of the hairs being brown like the subterminal portion.

Two males and one young adult female from

Recreio, Rio Majary, also agree in all respects with the Tapar type series.

Two adult males and three adult females comprising a series from "Pedral," a west bank locality of the Rio Tocantins, below and opposite Baio, average darker than the preceding, with one male



FIG. 11. Skull of old adult *Chiropotes satanas utahicki* with healed injuries. See text below for description.

nearly as blackish as least saturate members of *C. satanas satanas* of the east bank of the lower Rio Tocantins.

A faded skin only in poor condition of a large female (MPEG 436) from Rio Pracopi, Portel, agrees with the holotype series, but with dorsum appearing less brown, more buff or orange due to loss of the dark brownish tips of nearly all hairs. The clipped hair results from infestation with *pie-dra negra*, a fungus which appears as dark nodules in the pilary medulla. The infection causes the individual hairs to become brittle and break at the nodules.

Measurements of a large, unsexed skull (MPEG 6910, fig. 11) marked "Portel" agree best with those of the larger *Chiropotes albinasus* or *A. satanas chiropotes*. The nasal sutures are completely fused, triangular eminence of the frontal well defined, sagittal crest well developed but low for an old male. If of a female, the skull may belong to the Rio Pracopi skin described above. The skull is marked by a dent in nasal tips and left lower corner of the frontal eminence and the nearly complete repair of a previously fractured and abnormally inverted angle of left mandibular ramus. These appear to be scars of injury suffered at an

early stage of life. Location of the scars suggests the bite of an ocelot or larger carnivore. An incidental or coincidental feature is failure of upper outer permanent incisors to erupt. The permanent lower incisors are well worn (left outer lost posthumously) and widely spaced.

The inverted Y-shaped, flesh-colored rostral mark characteristic of young individuals of the species is present, although greatly reduced, in the youngest of the Recreio series (AMNH 95872 ♀) and youngest of the Pedral series (AMNH 96339 ♀). In both specimens the dentition is fully erupted, but the nasal sutures are unfused.

A juvenal (MPEG 92 ♀) labeled "Monte Alegre," which had died in the Zoological Garden of the Goeldi Museum, and a much older but still immature female (MPEG 6905) from the same zoo, with third molars unerupted, differ from the others by their more reddish brown coloration with less contrasted head and extremities. The inverted Y-shaped rostral mark is prominently displayed in both juvenals.

An extremely dark skin (USPMZ 13523, without skull) from Ponto do João Chaves, Itupiranga, left bank Rio Tocantins, Pará, collected 7 June 1967 by J. Hidasi, is slightly darker than the darkest skin of the "Pedral" series, but not quite as blackish as true *satanas* of the right bank of the Tocantins. Geographically, it is nearest the extremely pale, bearded saki from the upper Rio Xingu described below. Difference in coloration between the two specimens intimates a taxonomic problem which may not be solved without more specimens from the areas in question.

The extremely pale skin (with skull) of a young adult female (MPEG 2036, collected 6 August 1957 by J. Hidasi) from Posto Indígena, Atração Gorotire, Gradaús, right bank Rio Fresco, a right bank affluent of the upper Rio Xingu, Pará, may represent a distinct race. It is distinguishable from all other specimens of *utahicki* examined by paler coloration throughout, less contrast between torso and extremities, and smaller size. Its general description is given below.

Coloration of mid-dorsum and proximal portion of outer side of upper arms and thighs pale brown, hairs with concealed basal half buffy, terminal portion pale brown; sides of trunk including fringe hairs, crown, beard, remainder of arms and legs, hands, feet uniformly brown; bushy tail blackish brown superficially, basal portion of hairs orange; paired coronal tufts slightly developed, the hairs pale brown terminally, buffy basally, exposed ears brown, virtually bare; face nearly bare, skin

blackish except unpigmented narial borders; pudendum whitish with thin tuft of whitish hairs; underside of trunk and limbs thinly haired brown.

The skull of the Gorotire, Rio Fresco female (figs. 12–13) appears to be that of a young adult. The interparietal suture is incompletely closed, other sutures completely closed but not fused except the right premaxillo-maxillary suture which is nearly obliterated. Sutures in *Chiropotes*, however, do not begin to disappear before advanced old age. Dentition is fully developed with third molars moderately worn, canines fully erupted but hardly worn.

Ratios of dimensions of external, cranial, and dental features of MPEG 2036 agree with those of adult females of other taxa of *Chiropotes*. In comparable body-sized juvenal females of *C. satanas utahicki*, feet, braincase and teeth are much larger relative to head and body or condylobasal length, third molars and canines unerupted, the Y-shaped flesh colored muzzle mark present. On further comparison the smallest adult skull examined, that of the blackish *C. s. satanas*, is approximately equal to that of MPEG 2036 in length but larger in all other cranial and dental details measured (table 5).

More like this extremely small, pale, bearded saki possibly inhabit most of the upland gallery forests of the Serra de Gradaús and Serra dos Carajás between the Rio Fresco-Xingu and Rio Itacaiunas-Tocantins. Except for gallery forest continuous with the Amazonian selva, the region is comparatively dry and covered with brush (*cerado*).

SPECIMENS EXAMINED—Total 16. **BRAZIL.** **Pará:** Gorotire, Gradaús, 1 (MPEG); Itupiranga, 1 (USPMZ); Pedral, "Baião," Rio Tocantins, 5 (AMNH); Portel, Rio Pracupi, 2 (MPEG); Recreio, Rio Majary, 3 (AMNH); Tapará, Rio Xingu, 4 (AMNH; 3, FMNH).

This distinctive, brown, bearded saki is named in honor of Fräulein Uta Hick, Curator of the Kölner Zoo and long-time editor of the prestigious *Zeitschrift des Kölner Zoo*. Much is owed Miss Hick for her contributions to our knowledge of pitheciines. The largest assemblage of captive living pitheciines ever gathered flourished in the Kölner Zoo under Curator Hick's personal care. Many accounts of pitheciines, particularly of bearded sakis, with valuable information on reproduction, growth, and behavior, appeared in the *Zeitschrift* (sometimes under the Editor's name, at other times anonymously), all accompanied by some of the finest photographs of pitheciines ever published.

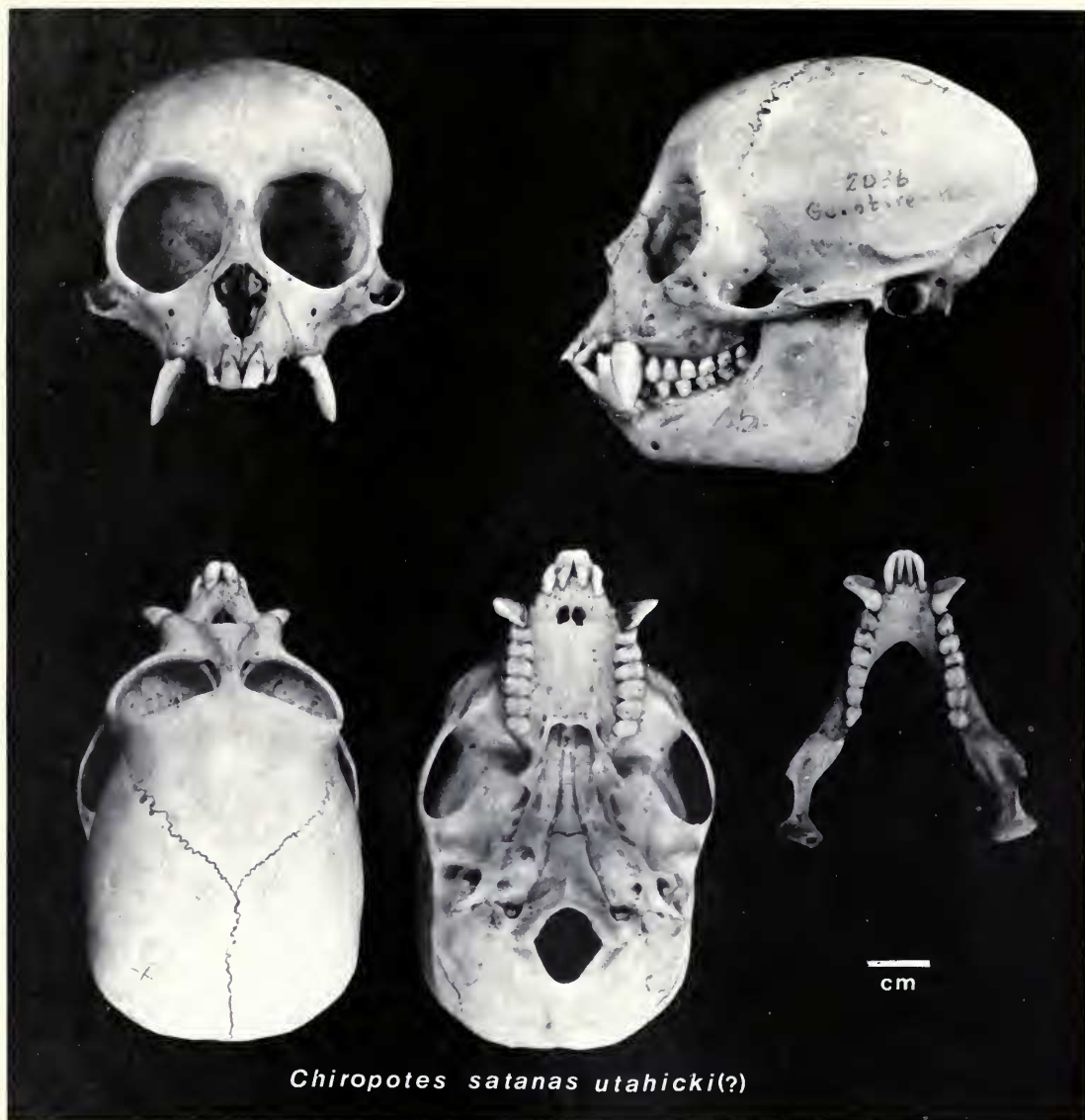


FIG. 12. Skull of young adult bearded saki (MPEG 2036 ♀) from Gorotire, questionably referred to *Chiropotes satanas utahicki*.

I am grateful for this opportunity to identify a pitheciine with the name of the one person who has done most to make the group familiar to the widest audience.

Chiropotes satanas satanas Hoffmannsegg

Cuxiu, Rodrigues Ferreira, 1972, *Viagem filosófica pelas capitâneas do Grão-Pará, Rio Negro, Mato Grosso e Cuiabá, 1783–1792, Memórias Zoologia, Botânica. Conselho Federal Cultura, Rio de Janeiro*, pp. 50, 141, iconografia, 2: pl. 122 (*cuxiu*), pl. 112

(*cuxiu-preto*)—BRAZIL: Grão Pará; characters; utilization.

Saki noir, F. Cuvier fils, 1842, in E. Geoffroy and F. Cuvier, *Hist. Nat. Mamm.*, 7, livr. 72, pl. (animal) and text—color plate of young menagerie animal.

Cebus satanas Hoffmannsegg, 1807, *Mag. Gesellsch. Naturf. Fr. Berlin*, 1: 93.

Simia satanas, Humboldt, 1811, *Rec. Obs. Zool. Anat. Comp.*, p. 315, pl. 27 (mounted holotype in Berlin Museum); 1812, p. 358—BRAZIL: Grão Pará; type history; characters; comparison with *Simia chiropotes* Humboldt; classification. Cuvier, 1817, *Règne Animal*, p. 115—classification.

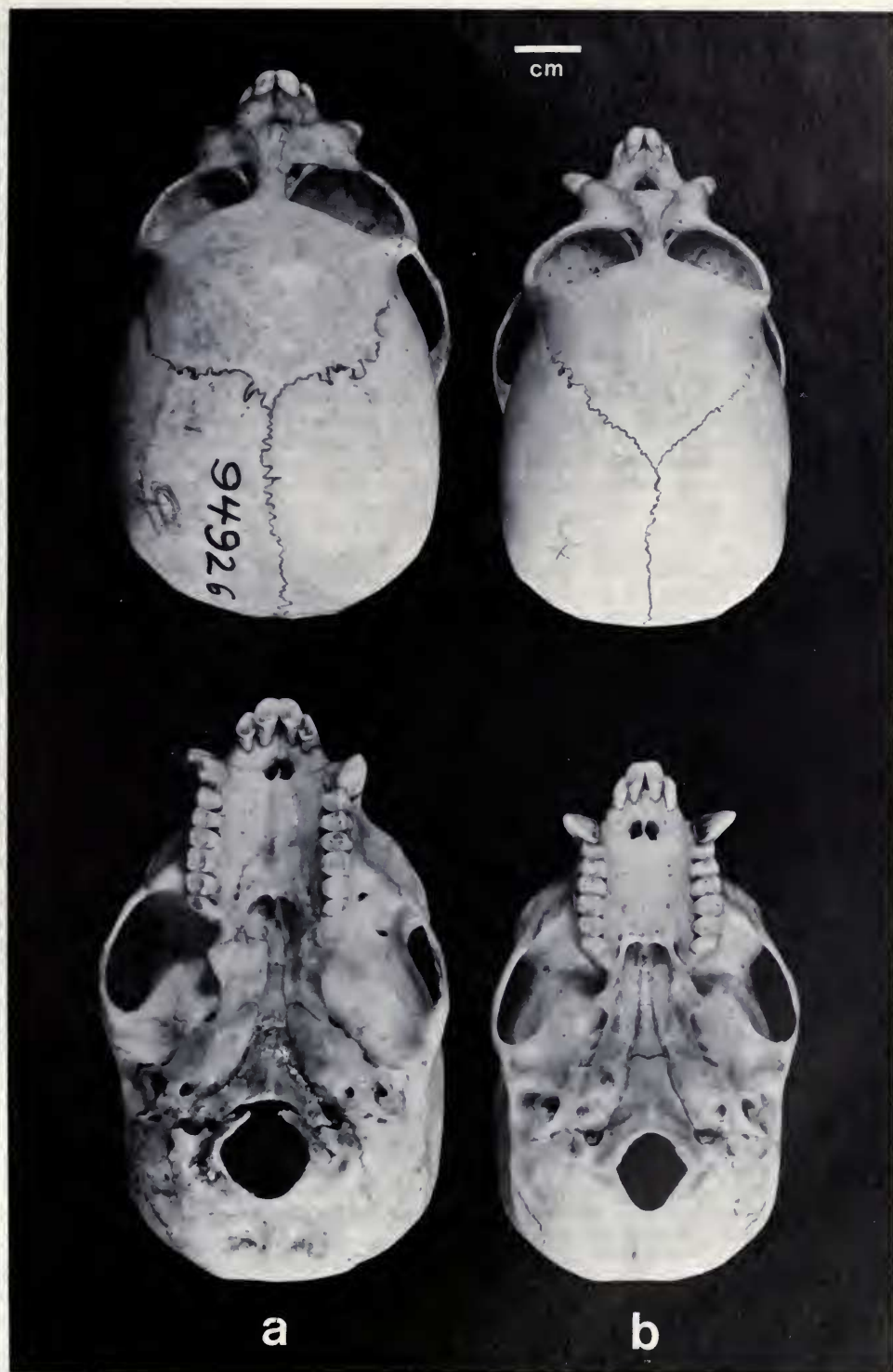


FIG. 13. Skull of b, young adult bearded saki (MPEG 2036 ♀ [*Chiropotes satanas utahicki*(?)]) from Gorotire compared with that of a, slightly younger *Chiropotes albinus* (AMNH 94926).

- S[ithecia]*. *Satanas*, I. Geoffroy, 1851, Cat. Primates Mus. Hist. Nat., Paris, pp. 56, 91 ("S" = *P* for *Pithecia*)—BRAZIL: mounted male collected by Rodrigues Ferreira brought to Paris Museum from Lisbon.
- Pithecia satanas*, E. Geoffroy, 1812, Ann. Mus. Hist. Nat. Paris, 19: 115—classification; characters. Desmarest, 1827, Dict. Sci. Nat., Paris, 47: 41—characters. Sclater, 1864, Proc. Zool. Soc. London, 1864: 138, 712, pl. 41 (animal)—addition to menagerie; characters. Sclater, 1866, Proc. Zool. Soc. London, 1865: 676—addition to menagerie. Sclater, 1871, Proc. Zool. Soc. London, 1871: 228—2 juvenal syntypes purchased for London Zoo 1864, 1868; *ater* Gray a synonym. Schlegel 1876, Les Singes. Simiae, p. 224—BRAZIL: *Pará* (Pará = Belém); characters. Jentink, 1887, Cat. Osteól. Mus. Pays-Bas, 9: 44—BRAZIL: *Pará* (Pará). Jentink, 1892, Cat. Syst. Mamm. Mus. Pays-Bas, 11: 50—BRAZIL: *Pará* (Pará). Forbes, 1882, Proc. Zool. Soc. London, 1882: 442—London zoo specimen with webbed digits 3, 4. Pelzeln, 1883, Verh. k. k. zool. bot. Gesellsch. Wien, Beih., 33: 16—BRAZIL: *Pará* (Pará = Belém); characters of female and young. Goeldi and Hagmann, 1904, Bol. Mus. Goeldi, 4: 49—BRAZIL: *Pará* (alto Rio Capim; Rio Acará; Castanhal). Elliot, 1913, Review of the Primates, 1: 296—BRAZIL: *Pará* (type locality, "Cametá," right bank Rio Tocantins near embouchure; characters, synonyms (*cuxio* [sic] Lesson, *nigra* Wagner, *ater* Gray, *niger* Gray [lapsus for *ater* Gray]. Cruz Lima, 1944, Mamíferos da Amazônia, Primates, Contrib. Mus. Paraense, Emilio Goeldi, p. 93, pl. 9 (animal)—BRAZIL: *Pará* (Alto Rio Capim; Rio Acará; Benevides, Castanhal); distribution (Rio Tocantins western limit); characters; habits.
- Pithecia Satanas*, Kuhl, 1820, Beitr. Zool. vergleich. Anat., 1: 42—specimens in Berlin, Paris, Prince Maximilian museums; characters; classification. Bates, 1864, Naturalist on the River Amazons, ed. 2: 99—BRAZIL: *Pará* (Cametá). Trouessart, 1897, Cat. Mamm., p. 43—"nigra et *satanas* Wagn[er]. Säugth. Suppl. V, 1855, p. 102," cited in synonymy.
- P[ithecia]*. *Satanas*, Wagner, 1840, Schreber's Säugth., Suppl., 1: 218—characters. Wagner, 1855, Schreber's Säugth., Suppl., 5: 102—part, the *nigra* variety [a descriptive term not a technical name] or *Cebus satanas* Hoffmannsegg.
- Pithæcia* [sic] *satanas*, Temminck, 1827, Monogr. Mamm., 1: xv—taxonomy.
- Pithecia satanas satanas*, Carvalho, 1960, Arq. Zool. São Paulo, 11(5): 125—BRAZIL: *Pará*; *Maranhão*. Carvalho, 1965, Arq. Zool., 12: 15—*cuxiu* of Rodrigues Ferreira, Viagem Filosófica.
- Pithecia* [satanas]. *satanas*, Carvalho, 1969, Rev. Biol. Trop., 15(2): 219—BRAZIL: *Pará* (Km 94, Belém-Brasília).
- Brachyurus satanas*, E. Geoffroy, 1829, Cours de l'histoire naturelle de mammifères, Leçon 10: 25—classification, characters. Gray, 1843, List specimens Mammalia British Museum, London, p. 13—part, *Chiropotes cuxio* Lesson a synonym.
- Ch[eiropotes]*. *Satanas*, Reichenbach, 1862, Vollst. Naturg. Affen, p. 73, figs. 179–182 (animals)—classification; characters.
- Chiropotes Satanas*, Gray, 1870, Cat. monkeys, le-
murs, fruit-eating bats, Brit. Mus., p. 61—BRAZIL: characters of adult male, female, juvenal in Paris museum.
- [*Chiropotes*] *satanas*, Pocock, 1925, Proc. Zool. Soc., London, 1925: 30—classification.
- Chiropotes satanas*, Böker, 1932, Gegenbaur Morph. Jahrb., 70: 54—BRAZIL: diet (fruit); gastrointestinal proportions. Vieira, 1955, Arq. Zool., São Paulo, 8: 381—BRAZIL: *Pará* (Rio Tocantins; Rio Pará; Benevides; Castanhal). Hill, 1960, Primates, 4(A): 220, pl. 14 (juv. female)—characters; distribution. Napier, 1976, Cat. Primates British Mus. (Nat. Hist.), 1: 74—part, BRAZIL: *Pará* (Igarapé Açu). Brehme, 1965, Zeitschr. Morph. Jahrb., 56(3): 206, fig. 33 (dermatoglyphs). pl. 29 (animal head)—dermatoglyphic variation. Deane, Ferreira Neto, Okumura, and Ferreira, 1969, Rev. Inst. Med. Trop., 11(2): 71—BRAZIL: *Pará*; *Maranhão*. Hick, 1973, Z. Köln. Zoo, 16(4): 142, fig. p. 138 (young, with partly white muzzle), "Nicky" in Kölner Zoo received when young; as adult did not permit himself to be photographed without attacking; figure shows nose of young unpigmented except between nostrils; Hick does not mention if nose became black with age. Ayres, 1981, Observações sobre a ecologia e o comportamento dos cuxius (*Chiropotes albinasus* e *Chiropotes satanas* Cebidae: Primates), Master's Thesis, Instituto Nacional de Pesquisas da Amazônia (INPA)—BRAZIL: *Pará* (locality records of specimens in AMNH; BM(NH), EC, MNRJ, MPEG, USPMZ; Vila Araújo; Itinga; Capim); ecology; habits; characters.
- Chiropotes satanas satanas*, Cabrera, 1958, Rev. Mus. Argentino Cienc. Nat. "Bernardino Rivadavia," 4(1): 147—classification; synonymy; distribution excluding type locality. Ferreira Neto, Deane, and Carneiro, 1970, Rev. Inst. Med. Trop. São Paulo, 12(3): 169—BRAZIL: *Maranhão* (Pão de Açúcar). Mittermeier, 1981, in Ecology and behavior of neotropical primates, Coimbra-Filho and Mittermeier, eds., 1: 77—classification. Rylands and Mittermeier, 1983, Oryx, 17: 83—endangered species.
- C[hiropotes]*. *s[atanas]*. *satanas*, Rylands and Mittermeier, 1982, Int. Zoo Yearb., 22: 31, 34—BRAZIL: distribution (Rio Xingu east "perhaps as far as the coast," may occur in the Piriá-Gurupí Ecological Station); habitat; endangered species.
- Chiropotes couxiu* Lesson, 1840, Species des mammifères: Bimanes et quadrumanes . . . p. 179—part, new name for *Cebus satanas* Hoffmannsegg; characters; part distribution. Lesson, 1842, Nouv. Tabl. Reg. Anim., Mamm., p. 8—distribution.
- Pithecia cuxio* [sic], Trouessart, 1897, Cat. mamm., p. 43—in synonymy of *P. satanas*.
- Chiropotes ater* Gray, 1870, Cat. monkeys, lemurs, fruit-eating bats, Brit. Mus., p. 61—"BRAZIL?" (type locality); type, young, British Museum (Natural History). Napier, 1976, Cat. Primates, Brit. Mus. (Nat. Hist.), 1: 75—two syntypes (juv., skin and skeleton BM 1864.8.17.1; juv., skin and skeleton, BM 1868.12.29.1).
- [*Pithecia*] *nigra*, Trouessart, 1897, Cat. Mamm., p. 43, in synonymy of *P. satanas*, name attributed to Wagner 1855, Schreber's Säugth. Suppl., 5: 102, where used as descriptive term for *P. satanas*.
- Pithecia satanas* var. *a. nigra* Elliott, 1913, Review of

the Primates, 1: 296—name in synonymy of *Pithecia satanas*; attributed to Wagner 1855, Schreber's Säugeth., Suppl., 5: 102, where "nigra" is used as Latin descriptive term for *Pithecia satanas*. Cabrera, 1958, Rev. Mus. Argentino Cienc. Nat. "Bernardino Rivadavia," (4), 1: 147—name attributed to Wagner, cited in synonymy of *satanas* Hoffmannsegg. "[*Pithecia satanas*] nigra," Cruz Lima, 1944, Mamíferos da Amazônia, 1. Primates, Contrib. Mus. Paraense Emilio Goeldi, p. 93—name attributed to Wagner 1855, in synonymy of *Pithecia satanas*. *Chiropotes niger*, Elliot, 1913, Review of the Primates, 1: 297—in text, *lapsus* for *Chiropotes ater* Gray; characters *ex* type; a synonym of *C. satanas*. *Pithecia Israelita*, Wagner (part not Spix), 1850, Abh. Akad. Wiss. München, 5: 433—BRAZIL: Pará. *Chiropotes albinasus* ♀ × *Chiropotes satanas* ♂, Hick, 1974, Z. Köln. Zoo, 17(4): 125, fig. 126 (mother with hybrid young)—hybrid born 3 December 1973 in Kölner Zoo.

HOLOTYPE—Adult male, skin mounted with skull in, originally in the Count van Hoffmannsegg Museum; collected by F. W. von Sieber, 1806. The large male in the Berlin Museum described and figured in color by Humboldt (1811, p. 315, pl. 27) is probably the holotype; if not, it is here designated lectotype.

TYPE LOCALITY—Vicinity of Belém, Pará, Brazil. As given by Hoffmannsegg (1807, p. 96), "Dieses Thier lebt in der Nachbarschaft der Stadt Pará [= Belém] in Brasilien und ist dort unter dem Namen *Cuxio* (Kuschio) bekannt. Weiter habe ich von demselben noch nichts erfahren."

Humboldt included a description and colored plate of Hoffmannsegg's *Cebus satanas* for comparison with his own *Simia chiropotes* from the banks of the Río Orinoco. The association led early authors to assume that *satanas* also originated in the Río Orinoco basin. Schlegel (1876, p. 225) returned the animal to Brazil, but with the misleading declaration that it "a été decouvert dans les environs de Cameté sur la rive droite du Tocantins près de son embouchure." Later authors followed Schlegel by listing Cameté as type locality (cf. Elliot, 1913, p. 297; Cruz Lima, 1945, p. 93; Cabrera, 1958, p. 147; Hill, 1960, p. 220).

DISTRIBUTION—Eastern Brazil, south of the Rio Amazonas, from the right bank of the Rio Tocantins in Pará, east, perhaps, to the Rio Gurupú and beyond in isolated patches of coastal forest in Maranhão as far as Baía de San Marcos and the Rio Pindaré. According to Rylands & Mittermeier (1982, p. 32), "*C. s. satanas* may occur in the Piriá-Gurupú Ecological Station but has yet to be confirmed Much of its range covers the most densely populated and developed areas of Brazilian Amazonia including the Zona Bragantina east

of Belem, and the southern and southeastern areas of the state of Pará." They regard *C. s. satanas* "as the most endangered primate taxon in Brazilian Amazonia today."

DIAGNOSTIC CHARACTERS—General coloration blackish brown or blackish with weak contrast between dorsum and darker extremities; terminal half of hairs unbanded.

COLORATION—Dorsum blackish brown to blackish, basal portion of hairs brown; sides of trunk including long fringe hairs, crown, beard, outer side of limbs including hands and feet, tail blackish, hairs uniformly colored or often with basal portion brown; underparts of body and inner side of limbs blackish; facial skin black but sometimes mottled, with narial margins and ear borders sometimes unpigmented.

MEASUREMENTS—See Table 8.

SPECIMENS EXAMINED—Total 25. **BRAZIL.** **Maranhão:** Santa Luzia, 1 (MNRJ); **Pará:** Benevides, 2 (AMNH; MPEG); Capim, 8 (USPMZ); Castanhal, 1 (MPEG); Km 307 Belém-Brasília, 1 (MPEG); Nova Timboteua, 1 (USNM); Paragominas, 2 (MNRJ); Pedral, Igarapé, upper Rio Guamá, 2 (MPEG); Ponto de João Chavez, Rio Tocantins, 1 (USPMZ); São Francisco de Trombetas, Fazenda, 1 (MNRJ); Sítio Leucas, Anhangá, 1 (MPEG); Km 107, Rodovia Belém-Brasília, 1 (LACM); Km 307, Rodovia Belém-Brasília, 3 (LACM).

***Chiropotes albinasus* I. Geoffroy and Deville (figs. 7, 14)**

quata-de-cara-vermelha, Rodrigues Ferreira, 1772, Viagem Filosófica, Conselho Federal de Cultura, Rio de Janeiro, Zool. Bot. Icon., 2: pl. 127—no text.

Pithecia albinasa I. Geoffroy and Deville, 1848, Comptes Rendus Acad. Sci., Paris, 27: 498—BRAZIL: Pará; abstract description. I. Geoffroy, 1852, Arch. Mus. Hist. Nat., Paris, 5: 559—BRAZIL: Pará (Santarém); characters. I. Geoffroy, 1855, Castelnau Expéd. Amérique Sud., pt. 7, Zool., Mamm., p. 16, pl. 2 (animal)—BRAZIL: Pará (house pet of Indians in Santarém). Sclater, 1881, Proc. Zool. Soc. London, 1881: 258, pl. 29 (animal)—addition to London zoo. Forbes, 1894, Hand-book to the primates, 1: 188, pl. 17 (animal)—characters. Elliot, 1913, Review of the Primates, 1: 295—characters *ex* type. Thomas, 1920, Ann. and Mag. Nat. Hist., ser. 9, 6: 268—BRAZIL: Pará (Rio Irirí, Rio Xingu); type from Santarém. Colyer, 1936, Variations and diseases of the teeth of animals, London, p. 60—m₃, m³ missing. Rode, 1938, Bull. Mus. Nat. Hist. Nat., 2(3): 232—holotype history. Cruz Lima, 1945, Mamíferos da Amazônia, Primates, Contrib. Mus. Paraense, p. 92, pl. 8 (animal)—BRAZIL: Pará (Altamira, Rio Xingu; Rio Irirí; Rio Jamanxim; Arapiuns, Rio Tapajós); characters.



FIG. 14. Female white-nosed bearded saki with hybrid young (*C. albinasus* ♀ × *C. satanas satanas* ♂). Photo courtesy Cologne Zoo.

P[ithecia]. albinasa, I. Geoffroy, 1851, Cat. Meth. Coll. Mamm. Oiseau Mus. Hist. Nat., Paris, p. 56—male holotype obtained from natives in Santarém; accessioned 1847 in Paris Museum; characters. Gray, 1860, Proc. Zool. Soc. London, 1860: 231—listed. Wagner, 1855, Schreber's Säugthiere, Suppl., 5: 101—characters.

Y[arkea] albinasa, Reichenbach, 1862, Vollst. Naturg. Affen, p. 27, fig. 77c (animal)—characters.

Chiropotes albinasa, Gray, 1870, Cat. monkeys, lemurs, fruit-eating bats, Brit. Mus., p. 60—BRAZIL. Miranda Ribeiro, 1914, Comm. Linhas Telegr. Zool. Anexo 5, Appendix p. 2—BRAZIL: Mato Grosso (São Manuel). Pocock, 1925, Proc. Zool. Soc. Lon-

dom, 1925c: 27, fig. 6 (mouth, thorium, ear, genitalia), fig. 7 (head, foot)—external characters. Vieira, 1953, *Arq. Zool.*, São Paulo, 3: 381—**BRAZIL**: *Pará* (between Rio Xingu and Tapajós; Arapiuns, Cricaré, and Fiquituba); *Rondônia* (Rio Porecatuina); *Mato Grosso* (São Manuel, Rio Teles Pires). Hill, 1960, *Primates*, 4(A): 223, pl. 16 (young animal)—characters; distribution. Jones, 1960, Jaws and teeth of primates, p. 123, figs. 27a-c (skull, teeth)—dentition. Hick, 1963, *Fr. Köln. Zool.*, 11(2): 35 (front cover, mother and young), text, fig. (mother and hybrid young)—mother and hybrid offspring (*albino* × *chirapates*) born in Köhler Zoo. Hick, 1969, *Fr. Köln. Zool.*, 12(1): 4—first zoo captive. Sarmiento, 1963, *Int. J. Primat.*, 4(2): 129—functional morphology of heel process.

[*Chirapates*], *albino*, Miranda Ribeiro, 1914, *Comm. Linth. Telgr. Zool.*, Amara 5: 17, pl. 6 (animal), pl. 7, figs. 2, 4 (skull), pl. 8, figs. 3-4 (skull), appendix, p. 2—**BRAZIL**: *Rondônia* (upper Rio Porecatuina [= Financa Buena]); local name *pinacul*; characters. Miranda Ribeiro, 1941, *Mem. Inst. Oswaldo Cruz* (1940), 35: 794, 808—**BRAZIL**: *Rondônia* (Macha de Molina; Comemoração de Floresta, Serra dos Parecis); *Mato Grosso* (Rio Teles Pires, upper Rio Arapiuns); *Pará* (Rio Iriri); characters.

Chirapates albino, Cabrera, 1933, *Rev. Mus. Argentino Cienc. Nat.*, "Bernardino Rivadavia," 4(1): 145—**BRAZIL**: *Pará* (Santarem, type locality). Hick, 1963, *Int. Zoo Yearb.*, 3: 193—female in Cologne Zoo, purchased 5 October 1960; characters; behavior. Coimbra Filho, 1972, *Especies de fauna Brasileira ameaçadas de extinção*, Acad. Bras. Cienc. Rio de Janeiro, p. 29—**BRAZIL**: distribution; characters, endangered species; quito-de-cara-vermelha of Rodrigues Ferreira (1972, pl. 127) regarded as *Chirapates albino*. Hick, 1973, *Z. Köln. Zool.*, 16(4): 141, figs. p. 113, 138 (female)—birth in Köhler Zoo; reproduction. Hick, 1974, *Z. Köln. Zool.*, 17(1): 1—first Köhler Zoo birth 3 December 1973. Ayres, 1981, *Observações sobre a ecologia e o comportamento dos curus (Chirapates albino e Chirapates satanas Cebidae: Primates)*. Master's thesis, Instituto Nacional de Pesquisas da Amazônia (INPA)—distribution (locality records of specimens in AMNH, BMNH, FZMNH, IEC, MNRJ, MPEG, USNMZ); sight records: Mato Grosso (Cachoeira de Dardanelos, Rio Arapiuns; Capivara, Rio Branco; Rio Arapiuns near mouth Igarapé Murú; Fazenda São José, right bank Rio Pequeno de Azevedo; Fontanillas, Rio Juruena); *Pará*: Parque Nacional da Amazônia; characters; ecology; behavior. Ayres and Milton, 1981, *Bull. Mus. Paraense Emílio Goeldi, Zool.*, no. 111: 4-6—**BRAZIL**: *Pará* (Parque Nacional da Amazônia, Km 34, Rio Tapajós, group size; habitat. Mittermeier, 1981, p. 77, figs. 52-53 (animals), in *Ecology and behavior of neotropical primates*, Coimbra-Filho and Mittermeier (eds.), Acad. Brasil. Cienc. Rio de Janeiro, 1—classification. *Cacajao roosevelti* J. A. Allen, 1914, *Bull. Amer. Mus. Nat. Hist.*, 32: 651—**BRAZIL**: *Rondônia* (type locality, Barão Melgaço, upper Rio Gy-Tarand [= Rio Japurá]); holotype, adult male, skin and skull, American Museum of Natural History no. 36916, collected 3 [Jan 4] March 1914, by Leo E. Miller.

Gondwan, 1953, *Bull. Amer. Mus. Nat. Hist.*, 102: 262—type history; a synonym of *Pithecia albino* Hill, 1960, *Primates*, 4: 244—characters; treated as a species of *Cacajao*.

[*Chirapates albino* × *Chirapates chirapates*], Hick, 1963, *Fr. Köln. Zool.*, 11(2): 35, fig. (mother with hybrid young)—Köhler Zoo, born 19 April 1963; growth; behavior.

Holotype—Male, skin mounted, skull separate, Muséum National d'Histoire Naturelle, Paris, no. 456, (460, 1847-1856); received in 1847 from the Casachau and Deville Expedition, who obtained the animal live in Santarém, from natives.

Type Locality—Brazil, in the State of Pará, restricted by Cabrera (1933, p. 146) to the vicinity of Santarém, lower Rio Tapajós, where the holotype was obtained.

Distribution—Brazil south of the Rio Amazonas from the west bank of the Rio Xingu-Iriri in Pará west to the Rio Madeira above the mouth of the Rio Arapiuns in the State of Amazonas south into Rondônia.

Diagnostic Characters—Blackish throughout, except nose and upper lips whitish or unpigmented; pelage of dorsum unbanded camelianin with terminal portion of hair paler than basal.

Coloration—Adult with rhomboidal flesh-colored patch covering face from inner canthus of eyes to outer sides of nostrils and upper lip and often lower lip, the whole sparsely covered with stiff, unpigmented cover hairs and scattered blackish vibrissae; coat blackish with hair tips of back and sides and often of lateral fringe silvery brown to unpigmented and translucent, of beard and tail pale brown; pelage of dorsum often parted medially, the part continuing along tail with basal portions of hairs slightly paler than middle portion; hairs of limbs blackish, tips sometimes pale; underparts usually entirely blackish; pelage of crown dense, the hairs radiating from vertex, cresting bilaterally to form short, stiff fringe in front and arching over ears on sides; coronal tufts and beard moderately to extremely well developed in older males, poorly in females.

Measurements—See Table 9.

Variation—Color of terminal portions of camelianin cover hairs range from nearly as dark as basal portions to silvery brown, creating a frosted effect, to completely depigmented and imparting a silvery sheen to the otherwise blackish hairs.

Geographic or local variation is not apparent. The holotype and paratype of *Cacajao roosevelti* J. A. Allen, 1914, from Barão Melgaço, are indistinguishable from other representatives of *Chirapates albino*.

SPECIMENS EXAMINED—Total 57. **BRAZIL.** Amazonas: Ayapuá, Foz do Castanho, 1 (MNRJ); Humaitá, 1 (USNM); Humboldt, 1 (USNM); Jareacanga-Itaituba, Km 212, 1 (MPEG); Lago Andirá, 1 (AMNH); Prainha, 1 (USPMZ); Serra de Parintins, 3 (AMNH); **Mato Grosso:** Coxin, Aripuanã, 1 (MNRJ); **Pará:** Alto Cururu, Arapiuns, 1 (MPEG); Aruã, Rio Arapiuns, 6 (USPMZ); Barreira, Rio Tapajós, 1 (USPMZ); Burbure, Rio Tapajós, 1 (AMNH); Cachimbo, 5 (MNRJ, 2; USPMZ, 3); Cachoeira da Estiva, Rio Jamanxin, 4 (MPEG); Caxiricatuba, Rio Tapajós, 5 (USPMZ); Cocal, Rio Irirí, 1 (MNRJ); Fordlândia, Rio Tapajós, 2 (USPMZ); Igarapé Amorim, Rio Tapajós, 1 (AMNH); Igarapé Bravo, Rio Tapajós, 1 (AMNH); Irirí, Rio, 1 (MPEG); Itaituba-Altamira, Km 25, 2 (MPEG); Limoal, Rio Tapajós, 3 (AMNH); Monte Cristo, 1 (USPMZ); Piquiatuba, 1 (USPMZ); São Manuel, Rio Teles Pires, 1 (MNRJ); Sumauma, 1 (USPMZ); Tapaiuna, 6 (AMNH, 3; FMNH, 3); Tucurucurazinho, Km 25, Itaituba-Altamira, 1 (MPEG); **Rondônia:** Barão Melgaço, 2 (AMNH, including holotype of *Cacajao roosevelti* J. A. Allen); Calama, 1 (AMNH); Chapada dos Parecis, Rio Jamari, 1 (MNRJ).

IV. Acknowledgments

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V. Gazetteer and Key to *Chiropotes* Collecting Localities (See Figure 2)

Acará (Rio); Pará, Brazil (21).
 Açu (= Assu) (Igarapé); Pará, Brazil (96).
 Agua Boa (Igarapé); Roraima, Brazil (35).
 Aldeia Tiriós, Rio Paru; Pará, Brazil (88a).
 Altamira, see Km 25 Itaituba-Altamira, Pará, Brazil (80).
 Amorim (Igarapé); Pará, Brazil (65).
 Amuku Creek; Corentyne, Guyana (7).
 Andirá (Lago); Amazonas, Brazil (50).
 Anhangá; Pará, Brazil (see Sitio Leucas).
 Anibá (Igarapé); Amazonas, Brazil (43).
 Apoteri Area; Rupununi, Guyana (4).
 Arapiuns; Pará, Brazil (65).
 Arimani (Mt.); Roraima, Brazil (36).
 Aruã (see Aruam); Pará, Brazil (64).
 Aruam; Pará, Brazil (64).
 Atures; Amazonas, Venezuela (26).
 Ayapuá, Lago de; Amazonas, Brazil (46).
 Barão Melgaço; Rondônia, Brazil (54).
 Barreira; Pará, Brazil (73).
 Belén; Amazonas, Venezuela (29).
 Bem (or Bom) Querer; ?Roraima, Brazil.
Chiropotes satanas chiropotes
 M. P. Anderson and R. H. Becker, 6 April 1913; expedition terminated 2 April, specimen may have been purchased pet that died on recorded date.
 Benevides; Pará, Brazil (92).
 Boa Vista, Rio Mucajaí; Roraima, Brazil (36).
 Boca = Mouth of a river (see name of).
 Boim, Rio Tapajós; Pará, Brazil (68).
 Bravo (Igarapé); Pará, Brazil (65).
 Burburê; Pará, Brazil (75).
 Cachimbo; Pará, Brazil (82).
 Cachoeira de Dardanelos; Mato Grosso, Brazil (56b).
 Cachoeira da Estiva; Pará, Brazil (76).
 Cachoeira da Porteira; Pará, Brazil (60).
 Cachoeira do Tronco; Pará, Brazil (61).
 Calama; Rondônia, Brazil (52a).
 Cametá; Pará, Brazil (88b).
 Caño = Canal (see name of).
 Capim; Pará, Brazil (95a).
 Capivara; Mato Grosso, Brazil (56a).
 Caracaraí; Roraima, Brazil (37b).
 Cararaucu; Amazonas, Brazil (40).
 Castanhal; Pará, Brazil (93).
 Castanho (Foz do); Amazonas, Brazil (48).
 Catrimani (Rio), see Pacu, Serra do; Roraima, Brazil (37a).
 Cauirima (Caño); Amazonas, Venezuela (31).

- Caxiricatuba; Pará, Brazil (67).
 Cayenne; French Guiana (Guyane Française) (24).
 Cerro = Mount, mountain, or hill (see name of).
 Chapada das Parecis, head Rio Jamari; Mato Grosso, Brazil (53).
 Cocal; Pará, Brazil (81).
 Coxin, Rio Aripuanã; Mato Grosso, Brazil.
Chiropotes albinasus
 Comissão Rondón, March 1904.
 Cuiperia (Lago); Pará, Brazil (62).
 Cunucunumá (Río, Boca); Amazonas, Venezuela (30).
 Cururu (Rio); Pará, Brazil (79).
 Dadanawa; Rupununi, Guyana (6).
 Dardanelos (Cachoeira de); Mato Grosso, Brazil (56b).
 Demerara (= Georgetown); Demerara, Guyana (8).
 Dimona (Fazenda); Amazonas, Brazil (39).
 Duida (Cerro); Amazonas, Venezuela (30).
 Esmeralda; Amazonas, Venezuela (31).
 Essequibo River (mouth); Guyana (1).
 Esteio (Fazenda); Amazonas, Brazil (45).
 Estiva (Cachoeira da); Pará, Brazil (76).
 Estrada = Road, highway (Brazilian).
 Faro; Pará, Brazil (59).
 Fazenda = Farm, plantation, cattle ranch, country estate (see name of).
 Fontanillas; Mato Grosso, Brazil (52b).
 Foothills Camp, Cerro Duida; Amazonas, Venezuela (30).
 Fordlândia; Pará, Brazil (70).
 Foz = River mouth.
 Gorotire (Reserva); Pará, Brazil (83).
 Humaitá; Amazonas, Brazil (48).
 Humboldt; Mato Grosso, Brazil (56b).
 Igarapé = Narrow waterway between two islands or an island and the mainland (see name of).
 INPA (Reserva do); Amazonas, Brazil (39).
 Itabani (Rio); Amazonas, Brazil (44).
 Itaituba; see Km 212, Itaituba-Jacareacanga; Pará, Brazil (77).
 Itinga; Pará, Brazil (98).
 Itupiranga; Pará, Brazil (87).
 Jacareacanga, see Km 212; Pará, Brazil.
 Jamanchim (Rio) (= Jamanxim, Rio); Pará, Brazil (76).
 Jamanxim (Rio); Pará, Brazil (76).
 Jari (Rio); Pará, Brazil (63).
 Jarú Reserva Biológica; Rondônia, Brazil (53a).
 João Chavez (Ponto de), see Itupiranga; Pará, Brazil (87).
 Juruena (Rio); Mato Grosso, Brazil (52b).
 Kaboeri Creek; Nickerie, Suriname (13).
 Kaiserberg Airstrip; Nickerie, Suriname (18).
 Km 46–48, Manaus-Itacoatiara; Amazonas, Brazil (41).
 Km 97, Rodovia BR-14, Capim; Pará, Brazil (96).
 Km 107, Belém-Brasília; Pará, Brazil (96).
 Km 134, Manaus-Itacoatiara; Amazonas, Brazil (41).
 Km 165, Manaus-Itacoatiara; Amazonas, Brazil (42).
 Km 170, Manaus-Itacoatiara; Amazonas, Brazil (42).
 Km 175, Manaus-Itacoatiara; Amazonas, Brazil (42).
 Km 190, Manaus-Itacoatiara; Amazonas, Brazil (42).
 Km 200, Manaus-Itacoatiara; Amazonas, Brazil (42).
 Km 212, Itaituba-Jacareacanga; Pará, Brazil (77).
 Km 307, Belém-Brasília; Pará, Brazil (97).
 Kuitaro River Area; Rupununi, Guyana (6).
 Lago = Lake (see name of).
 Leucas (Sítio); Pará, Brazil (93).
 Limoal; Pará, Brazil (64).
 Loksie Hattie; Brokopondo, Suriname (20).
 Lombok Falls; Nickerie, Suriname (15).
 Lucie River; Nickerie, Suriname (16).
 Macusi; Rupununi, Guyana (5).
 Manaus; Amazonas, Brazil (40).
 Mavaca (Boca); Amazonas, Venezuela (32).
 Mavaca (Río); Amazonas, Venezuela (33).
 Mineira (Fazenda); Pará, Brazil (87).
 Monte Alegre; Pará, Brazil
 2°01'S, 54°04'W, mislabeled locality for specimens of *Chiropotes satanas utahicki* preserved in the Goeldi Museum.
 Monte Cristo (Fazenda); Pará, Brazil (72).
 Moraballi Reserve; Mazaruni Potaro, Guyana (2).
 Morganito; Amazonas, Venezuela (27).
 Mucajaí (Rio); Roçaima, Brazil (36).
 Muriru (Igarapé, Foz de); Amazonas, Brazil (49).
 Nassau (Mts.); Marowijne, Suriname (22).
 Nhamundá, Primeira Cachoeira do Rio; Pará, Brazil (58).
 Nova = New.
 Nova Timboteua; Pará, Brazil (94).
 Ourém; Pará, Brazil (96).
 Oyapock (= St. George); French Guiana (25).
 Pacu (Serra do); Roçaima, Brazil (37a).
 Palomeu Camp; Marowijne, Suriname (23).
 Pão de Açúcar; Maranhão, Brazil
Chiropotes satanas satanas
 L. M. Deane and Carneiro, 1970.
 Pará; Pará, Brazil (90).
 Paragominas; Pará, Brazil (89).
 Parecis (Serra dos); Rondônia, Brazil (53b).

- Parintins (Serra de); Amazonas, Brazil (51).
 Paris Jacob Creek; Nickerie, Suriname (15).
 Parque Nacional da Amazonas; Pará, Brazil (74).
 Passarinho (Igarapé do); Amazonas, Brazil (40).
 Pedral, Pará, Brazil (86).
 Pedral (Igarapé); Pará, Brazil (96).
 Piquiatuba; Pará, Brazil (67).
 Pirocaua; Maranhão, Brazil (99).
 Pirotuluina, Rio (mouth); Rondônia, Brazil (55).
 Pitado; Amazonas, Venezuela (30).
 Poção; Roraima, Brazil (35).
 Porteira (Cachoeira do); Pará, Brazil (60).
 Potaro (mouth); Mazuruni-Potaro, Guyana (3).
 Pracopí (Rio); Pará, Brazil (85).
 Praia de Cachorro; Amazonas, Brazil (41).
 Prainha; Amazonas, Brazil (47).
 Puerto Ayacucho, see Morganito; Amazonas, Venezuela (27).
 Putiripá, Alto lago, Rio Capim; Pará, Brazil (95b).
 Recreio; Pará, Brazil (84).
 Rio Negro (Hacienda); Amazonas, Brazil (40).
 Rio = River (Portuguese).
 Río = River (Spanish).
 Rupununi; Rupununi, Guyana (4).
 San Fernando de Atabapo; Amazonas, Venezuela (30).
 San José (Fazenda); Mato Grosso, Brazil (57).
 San Juan; Amazonas, Venezuela (28).
 Santa Luzia; Maranhão, Brazil
 (possibly 7°38'S, 47°12'W)
Chiropotes satanas satanas
 L. M. Deane, November 1969.
 Santarém; Pará, Brazil (66).
 São Francisco de Trombetas (Fazenda); Pará, Brazil (94).
 São José (Fazenda); Mato Grosso, Brazil (57).
 São Manuel; Pará, Brazil (78).
 Seba; Guyana (9).
 Serpa (Lago do); Amazonas, Brazil (43).
 Serra = Mountain range
 Silves; Amazonas, Brazil (43).
 Sipaliwini Airstrip; Nickerie, Suriname (19).
 Sítio = Small farm or ranch (see name of).
 Stondansi Falls; Nickerie, Suriname (14).
 Suframa; Amazonas, Brazil (40).
 Sumauma; Pará, Brazil (69).
 Supinaam (River); Guyana (1).
 Tamatama; Amazonas, Venezuela (30).
 Tapaíuna; Pará, Brazil (68).
 Tapará; Pará, Brazil (84).
 Tapurucurazinho (Rio); Pará, Brazil (71).
 Tauraculli; Guyana (10).
 Teles Pires (Rio); Pará, Brazil (78).
 Tiriós, Rio Paru; Pará, Brazil (88a).
 Toototobi (Rio); Amazonas, Brazil (48).
 Triós, Rio Paru; Pará, Brazil (88a).
 Tronco (Cachoeira do); Pará, Brazil (61).
 Tuapara; Roraima, Brazil (34).
 Urubú, Rio (mouth); Amazonas, Brazil (43).
 Velho (a) = Old.
 Vila (or Villa, archaic) = Town, village.
 Vila Araújo, Ourém; Pará, Brazil (96).
 Vila Nova (Rio); Amapá, Brazil (100).
 Villa Bella Imperatriz; Amazonas, Brazil (50).
 Voltzberg; Saramacca, Suriname (21).
 West River; Nickerie, Suriname (17).
 Wikki River; Guyana (12).
 Wiruni River; Guyana (11).
 Wopsiana Island; Guyana
Chiropotes satanas chiropotes
 F. M. Endlich.
- GUYANA**
- CHIROPOTES SATANAS CHIROPOTES
1. Supinaam River, 6°59'N, 58°31'W.
W tributary of Essequibo River.
 1. Essequibo River, mouth, 6°55'N, 58°25'W.
E. R. Blake, March 1937.
 2. Moraballi Reserve, Essequibo River, 6°12'N,
58°34'W, 16 m.
N. A. Muckenhirn, B. K. Mortensen, S.
Vessey, C. E. O. Fraser, and R. Singh,
August, September 1975.
 3. Potaro River, 5°22'N, 59°09'W.
W tributary of Essequibo River.
Peberdy, October 1901.
 4. Rupununi River, 4°03'N, 58°34'W.
R. Schomburgk, January 1841.
 5. Apoteri Area, Essequibo River, 4°02'N,
58°34'W.
N. A. Muckenhirn, B. K. Mortensen, S.
Vessey, C. E. O. Fraser, and R. Singh,
September 1975.
 6. Macusi, 3°04'N, 59°44'W.
 6. Dadanawa, 2°50'N, 59°00'W.
Collection 25 mi E.
S. E. Brock, December 1962, June 1964.
 6. Kuitaro River Area (see Dadanawa).
S. E. Brock, December 1963.
 7. Amuku Creek, New River, 1°47'N, 58°12'W.
S. E. Brock, November 1964.
 8. Demerara (= Georgetown), Demerara River,
6°48'N, 58°10'W.
 9. Seba, Demerara River, 5°45'N, 58°02'W.
R. Singh, August 1952.
 10. Tauraculli, Abary River, 5°57'N, 57°48'W.
 11. Wiruni River, 5°42'N, 57°40'W.
N. A. Muckenhirn, B. K. Mortensen, S.

Vessey, C. E. O. Fraser, and R. Singh,
August 1975.

12. Wikki River, Berbice River, 5°25'N,
57°45'W.

N. A. Muckenhirn, B. K. Mortensen, S.
Vessey, C. E. O. Fraser, and R. Singh,
August 1975.

SURINAME

Nickerie

CHIROPOTES SATANAS CHIROPOTES

13. Kaboeri Creek, Corantijn River, 5°57'N,
57°06'W.
14. Stondansi Falls, Nickerie River, 5°09'N,
56°29'W.
15. Lonbock Falls, Nickerie River, 4°52'N,
56°52'W.
15. Paris Jacob Creek, Nickerie River, 4°54'N,
56°58'W.
16. Lucie River, Corantijn River, 3°35'N,
57°38'W.
17. West River, Wilhelmina Mts., 3°26'N,
56°45'W.
H. A. Beatty, October 1961.
18. Kaiserberg Airstrip, 3°10'N, 56°15'W.
H. A. Beatty, October, December 1960.
19. Sipaliwini Airstrip, Sipaliwini River, 2°05'N,
56°00'W.

Brokopondo

CHIROPOTES SATANAS CHIROPOTES

20. Loksie Hattie, Saramacca River, 5°10'N,
55°28'W.
P. Hershkovitz, December 1961, January
1962.
21. Voltzberg, 4°41'N, 56°10'W.

Marowijne

CHIROPOTES SATANAS CHIROPOTES

22. Nassau Mts., 4°45'N, 54°37'W.
23. Palomeu Camp, Tapahoni River, 3°19'N,
55°31'W.
(Airstrip, Tapahoni River.)
H. A. Beatty, April, June 1961.

FRENCH GUIANA (GUYANE FRANÇAISE)

CHIROPOTES SATANAS CHIROPOTES

24. Cayenne, 4°56'N, 52°20'W.
25. Oyapock (= St. George), 3°51'N, 51°49'W.

VENEZUELA

Amazonas

CHIROPOTES SATANAS CHIROPOTES

26. Atures, 5°35'N, 67°36'W.
27. Morganito, 70 km SSW Puerto Ayacucho,
5°06'N, 67°45'W, 161 m.
A. Tuttle, B. Inquilla, and E. L. Strome-
yer, October 1967.
28. San Juan, Río Manapiare, 5°18'N, 66°13'W,
155 m.
M. Tuttle and F. L. Harder, July 1967.
29. Belén, Río Cunucunumá, 3°39'N, 65°46'W,
150 m.
M. Tuttle and F. L. Harder, January 1967.
30. Duida, Mt. or Cerro Duida, 3°25'N,
65°40'W.
R. S. Deck.
30. Foothills Camp, Mt. Duida, 3°12'N,
65°33'W, 157 m.
G. H. H. Tate, November 1928.
30. Cunucunumá (Río), mouth, 3°11'N,
66°00'W, 135 m.
M. Tuttle.
30. Pitado, Mt. Duida, 5 km above San Fer-
nando de Atabapo.
R. S. Deck.
30. San Fernando, see San Fernando de Ata-
bapo.
30. San Fernando de Atabapo, Río Orinoco,
4°03'N, 67°42'W.
R. S. Deck, at 30 mi above.
31. Tamatama, Río Orinoco, 3°10'N, 65°49'W,
135 m.
M. Tuttle.
31. Caurima, Caño, Río Orinoco, 3°03'N,
65°28'W, 135 m.
M. Tuttle, F. L. Harder, and N. E. Peter-
son, November 1966.
32. Mavaca (Río), mouth 2°30'N, 65°13'W,
138 m.
M. Tuttle, A. Tuttle, F. L. Harder, and
N. E. Peterson, February 1966.
33. Mavaca, Río, 2°15'N, 65°17'W.
100 km SSE Esmeralda.
M. Tuttle and F. L. Harder, March, April
1967.

BRAZIL

Roraima

CHIROPOTES SATANAS CHIROPOTES

34. Tuapara, Rio Mucajaí, 2°39'N, 61°12'W,
near mouth Rio Apiaú.
C. Carvalho and M. C. Mello.

35. Água Boa, Igarapé, Rio Mucajaí, 2°42'N, 61°03'W.
O. Pinto and G. D. Dente, March 1962.
35. Poção, Rio Mucajaí, 2°40'N, 60°55'W.
C. Carvalho and M. C. Mello, 1959.
36. Mucajaí, Rio, N bank, 2°25'N, 60°54'W.
O. Pinto and E. Dente, March 1962.
E. Dente, March 1963.
36. Arimani, Mt., near Mucajaí.
J. Natterer, June 1832.
36. Boa Vista, lower Rio Mucajaí (*q.v.*).
- 37a. Pacu, Serra do, Rio Catrimani, 1°30'N, 62°15'W.
A. M. Olalla.
C. Lako, December 1932.
- 37b. Caracarai, 1°50'N, 61°08'W.
C. Carvalho and M. Mello, February 1959.

Amazonas

CHIROPOTES SATANAS CHIROPOTES

38. Toototobi, Rio, Rio Demeni, 1°34'N, 63°33'W.
B. Albert, 1981.
39. Dimona, Fazenda, Km 74, BR-174, 2°10'S, 60°20'W.
J. M. Ayres, 1981.
39. INPA, Reserva do, Km 45, BR-174, 2°25'S, 60°20'W.
Instituto Nacional de Pesquisas da Amazônia.
40. Passarinho, Igarapé do (see Manaus).
J. M. Ayres, 1981.
40. Manaus, 3°08'S, 60°00'W.
Olalla Brothers, July 1928.
40. Rio Negro (hacienda), Manaus (*q.v.*).
15 July 1928.
40. Cararaucu, Rio Amazonas (see Manaus).
J. Natterer, July 1834.
40. Suframa, Rio Cuiciras (see Manaus).
Agricultural district north of Manaus.
J. M. Ayres, June 1980–February 1981.
41. Praia do Cachorro, Rio Urubú, 3°00'S, 59°13'W.
M. C. Mello, December 1956.
41. Km 134, Manaus-Itacoatiara, 3°03'S, 59°13'W.
M. C. Mello, October 1966.
42. Km 165, Manaus-Itacoatiara, 3°01'S, 59°W.
M. C. Mello, February 1967.
F. Almeida, March 1967.
42. Km 170, Manaus-Itacoatiara, 3°00'S, 58°58'W.
M. C. Mello, June 1967.
42. Km 175, Manaus-Itacoatiara, 3°00'S, 58°56'W.

- M. C. Mello, December 1965, December 1966, September 1967.
42. Km 190, Manaus-Itacoatiara, 2°58'S, 58°52'W.
M. C. Mello, December 1965, December 1966;
A. Faustino and F. Almeida, December 1965.
42. Km 200, Manaus-Itacoatiara, 2°58'S, 58°49'W.
F. C. Almeida, October 1965.
43. Serpa, Lago do, 3°05'S, 58°30'W.
A. M. Olalla, October 1936.
43. Igarapé Anibá, Rio Amazonas, 2°55'S, 58°33'W.
A. M. Olalla, May, June 1937.
43. Urubú, Rio (mouth), 2°55'S, 58°25'W.
A. M. Olalla, May 1937.
43. Silves, Rio Amazonas, 2°54'S, 58°27'W.
A. M. Olalla, June 1937.
44. Itabani, Rio, Rio Amazonas, 2°47'S, 58°14'W.
A. M. Olalla, July 1937.
45. Esteio, Fazenda, Km 23, ZF-3, about 2°S, 59°40'W.
J. M. Ayres, 1980, 1981.

CHIROPOTES ALBINASUS

46. Deleted.
47. Prainha, Rio Aripuanã, 7°16'S, 60°23'W.
J. de Silva, October 1971.
48. Humaitá, Rio Madeira, 7°31'S, 63°02'W.
48. Castanho, Foz do, 7°37'S, 60°24'W.
Comissão Rondón.
49. Muriru (Mureru), Foz do Igarapé, Rio Aripuanã, 8°45'S, 59°15'W.
J. M. Ayres, 1979 (sight record).
50. Lago Andirá, 2°50'S, 56°55'W.
Olalla Brothers, September 1930.
50. Villa Bella Imperatriz (= Parintins) see Lago Andirá.
51. Parintins, Serra de, 2°50'S, 56°38'W.
Olalla Brothers, November 1930.

Rondônia

CHIROPOTES ALBINASUS

- 52a. Calama, Rio Madeira, mouth Rio Jiparaná, 8°03'S, 62°53'W.
- 52b. Fontanillas, Rio Juruena, right bank.
Not precisely located, see Juruena, Rio, mouth.
J. Ayres, (1981: 22; record 1978).
- 52b. Juruena, Rio, mouth, 7°20'S, 58°03'W.
Tributary of Rio Tapajós.

- 3a. Jaru Biological Reserve, 10°26'S, 62°27'W.
A. Rylands and R. Mittermeier (1983, *Oryx*, 17: 83).
- 3b. Parecis, Serra dos, 11°45'S, 60°56'W.
Comissão Rondón.
4. Barão Melgaço, Rio Comemoração, 11°45'S, 60°40'W.
L. E. Miller, March 1914.
5. Piroculuina, Rio (mouth), Rio Comemoração, 12°38'S, 60°12'W.
Comissão Rondón.

Mato Grosso

HIROPOTES ALBINASUS

- 6a. Capivara, Rio Branco, 9°50'S, 59°35'W.
J. M. Ayres (1981, records for 1979).
- 6b. Dardanelos, Cachoeira de, Rio Aripuanã, 10°20'S, 59°12'W.
J. M. Ayres (1983; records for 1977, 1978, 1979).
- 6b. Humboldt, 10°20'S, 59°12'W.
7. San José, Fazenda, R bank Rio Peixoto de Azevedo, 10°06'S, 55°31'W.
W. Bokerman, 1977, 1978 (in Ayres, 1981: 21).

Pará

HIROPOTES SATANAS CHIROPOTES

8. Nhamundá, Rio, Primeira Cachoeira, 1°22'S, 56°44'W.
9. Faro, Rio Amazonas, 2°11'S, 56°44'W.
Olalla Brothers, December 1930, January 1931.
10. Cachoeira da Porteira, L bank, Rio Trombetas, 1°05'S, 57°02'W.
Instituto Evandro Chavez, 1977.
11. Cachoeira do Tronco, Rio Erepecurú, 1°04'S, 56°02'W.
Lasso, April 1937.
12. Cuiperia, Lago, Rio Amazonas, 1°53'S, 54°53'W.
13. Jari, Rio, 1°10'S, 52°00'W.

HIROPOTES ALBINASUS

14. Aruam, Rio Arapiuns, 2°39'S, 55°38'W.
A. M. Olalla, May 1936.
14. Limoa, Rio Tapajós (see Aruam).
Olalla Brothers, July, August 1931.
15. Amorim, Igarapé, Rio Tapajós, 2°26'S, 55°00'W.
Olalla Brothers, July 1931.
15. Bravo, Igarapé, Rio Tapajós (see Igarapé Amorim).
Olalla Brothers, January 1931.

65. Arapiuns, 2°18'S.
66. Santarém, Rio Tapajós, 2°26'S, 54°42'W.
67. Caxiricatuba, Rio Tapajós, 2°36'S, 54°56'W.
A. M. Olalla, May 1936.
67. Piquiatuba, Rio Tapajós, 2°40'S, 54°58'W.
A. M. Olalla, May 1936.
68. Boim, Rio Tapajós, 2°49'S, 55°10'W.
A. M. Olalla, December 1932.
68. Tapaiuna, Rio Tapajós, 2°54'S, 55°05'W.
A. M. Olalla, October 1960.
69. Sumauna, Rio Tapajós, 3°35'S, 55°35'W.
A. M. Olalla, May 1963.
70. Fordlândia, L bank, Rio Tapajós, 3°40'S, 55°30'W.
A. M. Olalla, August 1966, June 1971.
71. Tapurucurazinho, Rio, 3°50'S, 55°35'W.
Km 25, Itaituba-Altamira.
72. Monte Cristo, Fazenda, L bank, Rio Tapajós, 4°04'S, 55°38'W.
E. Garbe, 1920.
73. Barreira, L bank, Rio Tapajós, 4°04'S, 55°53'W.
74. Parque Nacional da Amazônia, L bank Rio Tapajós, 4°20'S, 56°05'W.
Km 54, Itaituba-Jacareacanga.
J. M. Ayres (1981; sight records, September, October, 1979 at Km 54, Itaituba-Jacaré-Acanga Highway).
75. Burburê, L bank Rio Tapajós, 4°37'S, 56°15'W.
76. Jamanchim, or Jamanxim, Rio, 4°43'S, 56°18'W.
E. Snethlage, 1917.
76. Estiva, Cachoeira da, Rio Jamanchim, 5°29'S, 55°47'W.
E. Snethlage, August 1909.
77. Km 212, Itaituba-Jacareacanga, 5°55'S, 57°15'W.
78. São Manoel, Rio Teles Pires, 7°21'S, 58°03'W.
F. C. Hoehne, 1914.
78. Teles Pires, Rio (see São Manoel).
F. C. Hoehne, March 1912.
79. Cururu, Rio, 7°45'S, 57°30'W.
H. Sick, July 1957.
80. Altamira, Rio Xingu, 3°12'S, 52°12'W.
81. Cocal, Rio Irirí, mouth of Irirí at 3°52'S, 52°37'W.
E. Snethlage, July 1914, July 1916.
82. Cachimbo, 8°57'S, 54°54'W.
E. Dente, November 1955;
Werner, June 1955;
H. Sick, June 1957.

CHIROPOTES SATANAS UTAHICKI

83. Gorotire, Gradaús, Rio Fresco, Rio Xingu, 7°43'S, 51°09'W.
J. Hidasi, September 1957.
84. Recreio, Rio Majary, R bank Rio Xingu, 1°42'S, 52°12'W.
Olalla Brothers, September 1921.
84. Tapará, R bank Rio Xingu, 1°38'S, 52°05'W.
Olalla Brothers, August 1931.
85. Rio Pracopi, Portel, 2°05'S, 51°30'W.
M. Lasso, January 1939.
86. Pedral, Rio Tocantins, below Baião (*q.v.*).
Olalla Brothers, December, 1931.
A. M. Olalla's journal, now preserved in the American Museum of Natural History, informs that his field party of collectors operated from 26 November to 25 December 1931 in Baião on the east bank of the lower Rio Tocantins. During this period, Olalla himself made an excursion "al lugar denominado 'Pedral'" in search of large mammals. He returned to Baião December 16 with some specimens listed separately in his field catalog. Nowhere in his journal does Olalla reveal the geographic position of "the place called 'Pedral'" relative to Baião or how long it took him to get there, presumably by boat or canoe. The *Chiropotes* brought back from "Pedral" agree with the west bank *C. satanas utahicki*. Sakis of Baião on the east bank of the Rio Tocantins are the blackish *C. satanas satanas*. According to Dr. P. Vanzolini (*in litt.*) Pedral is indeed on the west or left bank of the Rio Tocantins in the Município of Cametá, not Baião as given on the skin labels.
86. Baião, E bank lower Rio Tocantins, 2°40'S, 49°45'W.
87. Ponto de João Chavez, L bank Rio Tocantins (see Itupiranga).
87. Itupiranga, L bank Rio Tocantins, 5°08'S, 49°21'W.
87. Mineira, (Fazenda), Itupiranga (see Itupiranga).
Km 42, Marabá-Altamira.
Instituto Evandro Chavez, 1977.

CHIROPOTES SATANAS SATANAS

- 88a. Tiriós or Triós, aldeia, upper Rio Paru, 2°18'N, 55°16'W.
J. Ayres (1981: 23)

- 88b. Cametá, opposite, R bank Rio Tocantins.
89. Paragominas, ca. 05°00'S, 48°40'W.
Estrada Belém-Marabá, May 1970.
90. Pará, old name of Belém (*q.v.*).
90. Belém, 1°27'S, 48°29'W.
91. Acará, Rio, 1°40'S, 40°25'W.
92. Benevides, 1°22'S, 48°15'W.
August 1911.
93. Castanhal, 1°18'S, 47°55'W.
93. Leucas (Sítio), Anhangá, 1°11'S, 47°49'W.
Instituto Oswaldo Cruz, November 1957.
94. Nova Timboteua, 1°02'S, 47°20'W.
A. Pinto Souza de Souza, March 1948.
94. São Francisco de Trombetas (Fazenda), 1°12'S, 47°24'W.
Serviço dos Estudos e Pesquisas Sobre Febra Amarela (SEPSFA), March 1948.
- 95a. Capim, 1°41'S, 47°47'W.
Km 93, BR 14, Belém-Brasília.
Departamento de Zoologia, Museu São Paulo and Conselho Nacional de Pesquisas, August, September 1959.
- 95b. Putiripá (or Puritirá or Putiritá), 3°00'S, 47°45'W.
Rio Capim basin.
J. Ayres (1981: 22; 1977 report).
96. Ourém, 1°33'S, 47°06'W.
96. Km 97, Rodovia BR-14 Capim (see Ourém).
96. Km 107, Belém-Brasília.
96. Vila Araújo (see Ourém).
J. M. Ayres (1983: 22; record 1977).
96. Pedral, Igarapé, Rio Guamá (see Ourém).
M. Moreira, October 1977, February 1978.
96. Açu (or Assu), Igarapé, 1°32'S, 47°03'W.
January, February, March 1904.
97. Km 307, Belém-Brasília, 4°00'S, 47°10'W.
E. Dente, July 1960.
98. Itinga, 4°25'S, 47°30'W.
J. M. Ayres (1981, sight record 1979, communicated by K. Milton).

Maranhão

CHIROPOTES SATANAS SATANAS

99. Pirocaua, ca. 1°15'S, 46°00'W.
Lima, December 1909.

Amapá

CHIROPOTES SATANAS CHIROPOTES

100. Vila Nova, Rio, Mazagão, 0°04'S, 51°13'W.
M. Lasso, May 1930.
Schultz-Kampf, 1936.

TABLE 5. Morphometric comparisons of MPEG 2036 from Gorotire with other females of *Chiropotes* (means followed by extremes in parentheses and number of samples).

Character	<i>utahicki</i> MPEG 2036 ♀ adult		<i>utahicki</i> MPEG 6905* ♀ juv.	<i>utahicki</i> ♀ adults	<i>satanas</i> ♀ adults	<i>chiropotes</i> ♀ adults	<i>albinasus</i> ♀ adults
Head and body (HB)	358†	330†	367 (359-370)	5	369 (335-388)	7	418 (360-515)
Hind foot (HF)	105†	110†	117 (110-127)	5	112 (110-117)	5	124 (100-140)
HF:HB	29%	33%	32%		30%		30%
Condyllobasal length (CB)	62.2	58.3	65.9 (64.8-67.2)	5	66.0 (63.2-68.7)	7	72.2 (66.3-77.6)
PM2-M3	16.8	16.5‡	17.2 (16.5-17.8)	5	17.5 (16.8-18.0)	7	19.0 (18.0-20.3)
PM2-M3:CB	27%	28%	26%		26.5%		30%
Braincase width (BCW)	46.2	46.0	48.9 (47.7-50.4)	5	49.0 (47.7-50.2)	6	50.1 (47.8-52.5)
Braincase length (BCL)	61.5	58.4	64.4 (63.5-65.5)	5	64.1 (62.4-66.6)	7	67.8 (64.0-71.5)
BCW:BCL	75%	79%	76%		76%		74%
BCW:CB	73%	79%	74%		74%		69%

* Zoological Garden, Belém. † Measurement from dry skin. ‡ Estimated, m3 crown at alveolar level; canine deciduous.

TABLE 6. *Chiropotes satanas chiropotes* Humboldt (measurements in mm; first figure of series is mean followed by extremes in parentheses and number of samples).

Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condyllobasal length	Zygomatic breadth	Biorbital breadth
Brazil								
Anitbá, Igarapé δ	—	—	—	—	95.5	77.4	59.4	45.0
Atabani, Rio δ	380	110	110	—	90.5	73.6	60.0	44.3
Boa Vista δ	430	115	115	30	90.2	72.0	56.9	48.5
Bom Querer δ	—	—	—	—	93.1	73.4	60.5	47.7
Cachoeira do	—	—	—	—	90.6	73.9	59.2	45.7
Tronco δ								
Faro δ	409 (362-459)	6	422 (392-463)	6	127 (122-133)	6	89.5 (84.3-92.2)	5
Km 190-200	—, —, —	—, —, —	—, —, —	—, —, —	92.6, 93.0, 94.9	73.6, 74.1, 74.7	60.8, 60.9, —	46.1 (43.4-48.6)
(AM-1) δ	—	—	—	—	91.1 (90.0-92.2)	72.7 (69.8-75.3)	57.9 (53.8-61.1)	5
Km 165-175	—	—	—	—	91.2	71.6	56.3	47.0, 47.5, 46.3,
(AM-1) δ	—	—	—	—	91.2	71.6	56.3	46.8
Km 134	—	—	—	—	91.5, 94.7	73.6, 76.4	60.1, 61.8	44.8
(AM-1) δ	—, —	—, —	—, —	—, —	91.0	74.5	58.5	46.7, 48.8
Km 46-48	—	—	—	—	89.9	68.7	55.7	45.0
(AM-1) δ	375	340	120	—	—	—	—	—
Serpa, Lago do δ	437	420	120	—	—	—	—	—
Urubá, Rio δ	—	—	—	—	—	—	—	—

TABLE 6. Continued.

Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹ -M ³
Brazil									
Anibá, Igarapé	36.2	71.0	49.5	13.8	12.7	35.6	23.8	18.0	10.0
Atabani, Rio	39.8	66.8	51.2	—	—	34.6	23.7	18.4	9.8
Bom Vista	42.1	65.8	50.3	—	—	33.9	24.5	18.8	—
Bom Querer	41.7	70.8	49.8	—	—	35.2	24.7	18.5	10.0
Cachoeira do Tronco	39.2	66.2	49.0	—	—	36.4	25.4	18.8	—
Faro	39.8 (37.7–42.5)	66.8 (65.0–68.0)	50.7 (49.1–52.4)	—	—	34.4 (31.9–36.6)	24.9 (24.1–26.1)	18.4 (17.0–19.4)	10.1 (9.5–10.5)
Km 190–200 (AM-1)	39.6, 39.9, 40.4	67.6, 67.1,	51.0, 50.0,	—, —, —	—, —, —	35.3, 34.7, 35.9	25.0, 25.3, 25.4	18.8, 18.9, 19.1	—, —, —
Km 165–175 (AM-1)	39.3, 40.2, 40.3, 41.5	66.2 (65.0–67.3)	49.9 (48.3–50.8)	—	—	34.1 (32.6–36.2)	24.1 (23.2–24.7)	18.0 (17.4–19.1)	—
Km 134 (AM-1)	40.2	66.4	48.1	—	—	34.3	24.5	18.3	—
Km 46–48 (AM-1)	39.0, 40.7	69.5, 68.6	49.6, 52.6	—, —	—, —	32.6, 36.2	23.0, 25.8	17.7, 20.0	—, —
Serpa, Lago do	36.2	64.8	46.8	—	—	36.0	25.4	18.9	10.5
Urubú, Rio	39.5	68.5	51.0	—	—	33.4	25.1	18.8	9.9
Brazil									
Locality	I ² -I ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar height	Symphyseal angle			
Anibá, Igarapé	11.9	31.6	24.6	63.5	43.9	55			
Atabani, Rio	—	32.3	—	56.0	39.8	50			
Bom Vista	—	31.9	—	56.4	42.6	46			
Bom Querer	13.4	32.1	25.7	57.7	45.8	48			
Cachoeira do Tronco	—	32.3	—	57.5	38.1	54			
Faro	12.6 (11.8–13.7)	31.8 (29.3–35.0)	24.3 (23.3–25.2)	56.2 (50.9–60.1)	39.8 (35.1–45.1)	52 (45–60)			
Km 190–200 (AM-1)	—, —, —	33.3, 32.6, 31.3	—, —, —	57.2, 59.3, 57.5	42.8, 38.0, 40.6	42, 50, 43			
Km 165–175 (AM-1)	—	32.0 (29.6–34.0)	—	56.1 (34.1–58.5)	40.9 (37.1–43.8)	54 (43–46)			
Km 134 (AM-1)	—	31.1	—	55.5	38.8	42			
Km 46–48 (AM-1)	—, —	—, 34.2	—, —	57.8, 61.3	44.5, 49.1	59, 42			
Serpa, Lago do	—	33.8	—	57.3	47.5	48			
Urubú, Rio	—	30.7	—	53.1	35.3	51			

TABLE 6. Continued.

Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condylbasal length	Zygomatic breadth	Biorbital breadth	
Brazil									
Agua Boa, Igarapé ♀	380	340	115	30	86.5	66.5	53.9	45.2	
Anibá, Igarapé ♀♀	391, 455	394, 370	105, 115	—, —	90.2, 91.5	71.8, 71.5	57.8, 54.6	45.9, 44.3	
Atabani, Rio ♀♀	385, 405, 405	440, 420, 430	135, 126, 123	—, —, —	92.9, 91.6, 91.2 ¹	71.0, 72.2, 73.5	56.5, 57.6, 56.5	49.4, 48.5, 45.5	
Cachoeira do Tronco ♀	—	—	—	—	87.3	67.1	56.4	45.1	
Caracará ♀	—	—	—	—	86.1	67.7	55.4	45.4	
Faro ♀♀	390 (327–430) 7	422 (400–450) 7	125 (120–130) 7	—	88.4 (86.0–90.5) 6	70.6 (67.6–74.0) 6	56.8 (54.1–57.8) 6	45.9 (44.1–47.4) 6	
Km 190 (AM-1) ♀	—	—	—	—	92.6	75.6	58.7	44.7	
Km 165–170 (AM-1) ♀♀	—	—	—	—	92.5 (88.1–95.5) 7	72.7 (68.0–75.3) 7	57.9 (55.1–61.3) 7	46.3 (44.4–48.7) 7	
Manaus ♀	—	—	—	—	90.2	74.2	61.1	46.6	
Poçoá ♀	370	400	121	30	86.1	67.7	55.5	45.5	
Silves ♀	380	410	125	—	90.6	73.8	57.9	46.0	
Urubú, Rio ♀♀	415, 413	405, 400	125, 125	—, —	90.7, 92.9	72.9, 75.6	59.1, 59.2	44.6, 45.3	
Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹ -M ³
Brazil									
Agua Boa, Igarapé ♀	40.3	63.6	49.1	—	—	32.5	23.2	18.0	9.5
Anibá, Igarapé ♀♀	41.0, 40.0	65.6, 68.7	49.6, 49.4	—, —	—, —	34.7, 33.1	24.5, 23.5	18.9, 18.3	9.9, 9.5
Atabani, Rio ♀♀	41.3, 42.1, 39.3	70.0, 67.3, 63.9	50.6, 51.2, 48.7	—, —, —	—, —, —	35.3, 34.4, 36.9	25.2, 23.5, 26.3	19.0, 19.0, 20.6	11.3, 10.5, 10.5
Cachoeira do Tronco ♀	40.3	67.0	51.1	—	—	—	22.9	17.4	—
Caracará ♀	41.2	66.1	51.8	—	—	33.8	24.6	18.8	—
Faro ♀♀	41.4 (39.3–42.2) 6	66.9 (65.2–69.3) 6	50.1 (48.6–52.1) 6	—	6.8 (6.1–7.6) 6	33.8 (32.2–35.2) 6	24.3 (23.4–25.6) 6	18.0 (17.2–18.9) 6	9.6 (9.0–10.0) 6
Km 190 (AM-1) ♀	37.7	63.5	47.4	—	—	36.0	25.0	18.7	—
Km 165–170 (AM-1) ♀♀	40.8 (39.5–42.1) 7	68.2 (66.1–70.8) 7	50.7 (48.1–52.4) 7	—	—	34.2 (32.1–37.0) 7	24.2 (23.4–25.7) 5	19.2 (17.6–21.0) 7	—
Manaus ♀	42.5	68.9	53.9	—	9.7	34.5	24.9	19.3	10.3
Poçoá ♀	41.2	66.1	51.8	—	—	33.8	24.6	18.8	—
Silves ♀	39.8	65.5	47.8	—	—	34.8	24.8	18.7	9.8
Urubú, Rio ♀♀	39.2, 37.1	66.1, 68.2	50.4, 49.6	—, —	—, —	34.5, 35.7	24.8, 25.5	19.0, 19.6	10.2, 10.2

Locality	I ² -I ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar length	Symphyseal angle
Brazil						
Agua Boa, Igarapé ♀	—	29.1	—	—	36.8	—
Anibá, Igarapé ♀♀	—, —	33.7, 31.3	—, —	53.8, 53.4	38.5, 37.7	56, 42
Atabani, Rio ♀♀	—, —, —	32.3, 33.3, 36.0	—, —, —	54.7, 55.7, 55.7	38.7, 38.5, 36.5	52, 40, 43
Cachoeira do Tronco ♀	—	31.1	—	54.1	40.1	53
Caracarái ♀	—	30.1	—	52.5	38.4	44
Faro ♀♀	12.5 (11.7–13.4) 6	31.4 (28.5–34.0) 6	23.9 (22.9–24.4) 6	54.4 (50.5–57.1) 6	37.2 (35.2–39.2) 6	53 (47–60) 6
Km 190 (AM-1) ♀	—	33.5	—	59.4	42.7	46
Km 165–170 (AM-1) ♀♀	—	31.1 (29.5–32.7) 7	—	55.7 (53.5–60.0) 6	39.4 (35.9–43.7) 6	50 (40–57) 6
Manaus ♀	12.1	31.2	24.9	53.5	40.0	49
Poçoá ♀	—	30.1	—	52.5	38.4	44
Silves ♀	—	33.6	—	57.2	38.1	46
Urubú, Rio ♀♀	—, —	30.9, 32.7	—, —	55.4, 57.8	—, 42.5	—, 42
Guyana						
Kuitaro River ♂♂	—	—	—	91.8, 91.9	72.7, 74.2	56.5, 59.8
Essequibo River ♀♀	379, 373	414, 407	—, —	90.5, 90.0	70.2, 71.0	56.6, 59.1
Kuitaro River ♀♀	—	—	—	86.0, 90.2	67.5, 70.2	56.5, 55.9
Suriname						
Kaiserberg ♂	—	—	—	89.6	73.9	—
Loksie Hattie ♂♂	406, 407	446, 430	31, 30	93.5, 91.8	73.9, 74.7	63.4, 60.8
Palomeu ♂	410	430	28	92.0	74.8	57.9
West River ♂♂	400, 370	370, 360	30, 30	87.5, 86.9	69.7, 70.3	59.0, 58.2
Kaiserberg ♀	394	400	34	86.5	68.6	54.7
Palomeu ♀♀	410, 410, 423	410, 430, 380	30, 35, 34	88.0, —, 89.5	68.6, —, 71.7	57.6, —, 47.2, —, 45.5
Venezuela						
Cunucunumá ♂♂	385, 400, 355	280, 390, 300	29, 32, 30	87.5 (83.4–92.0) 4	70.4 (65.0–74.4) 4	55.5 (53.0–58.7) 5
Duida, Mt. ♂	—	—	—	88.3	68.8	55.8
Mavaca, Río ♂	374	370	29	89.4	77.5	54.4
San Juan ♂♂	400, (364–459) 5	378 (366–392) 5	31 (30–32) 5	88.1 (85.9–92.4) 7	68.4 (65.2–70.6) 7	56.0 (52.5–57.8) 7
Caurima, Caño ♀	381	376	29	85.7	65.2	52.3
Cunucunumá ♀♀	371 (345–389) 6	377 (353–400) 6	—	87.5 (86.3–89.3) 7	67.5 (68.8–69.4) 7	54.6 (53.6–56.4) 7
Mavaca, Río ♀♀	378 (371–387) 4	377 (350–390) 4	29 (27–31) 4	87.2 (84.7–88.2) 4	68.6 (66.8–70.2) 4	55.6 (53.8–57.0) 4
San Juan ♀♀	403 (370–460) 10	394 (365–435) 10	30 (25–32) 10	87.4 (84.7–89.2) 7	67.5 (64.4–69.7) 7	54.9 (51.2–57.1) 8

TABLE 6. Continued.

Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹ -M ³
Guyana									
Kuitaro River ♂♂	40.0, 40.5	67.5, 67.3	49.8, 49.6	—	9.9 (8.5–11.5) 5	33.5, 35.5	23.1, 25.2	17.8, 19.2	9.5, 10.3
Essequibo River ♀♀	40.0, 41.0	66.9, 67.6	—, 53.2	—, 13.5	—, 12.0	32.7, 33.3	20.8, 23.3	17.0, 17.1	8.0, 9.1
Kuitaro River ♀♀	39.5, 41.7	64.4, 68.4	48.7, 51.0	—	4.7, 4.9	—, 34.3	25.7, 25.8	19.4, 19.5	10.4, 10.6
Suriname									
Kaiserberg ♂	—	65.6	47.6	—	—	—	—	—	—
Loksi Hattie ♂♂	41.7, 42.2	66.7, 66.3	50.5, 49.5	13.4, 15.3	10.4, 10.8	34.6, 34.4	23.5, 24.4	18.5, 18.3	9.4, 10.0
Palomeu ♂	41.3	69.5	49.0	—	—	35.7	25.1	18.9	10.3
West River ♂♂	39.5, 40.0	63.8, 64.3	48.2, 52.2	10.0, 10.3	11.5, 9.4	34.3, 33.9	25.1, 24.8	18.4, 18.7	9.3, 10.1
Kaiserberg ♀	38.8	65.7	48.3	10.4	9.1	33.3	24.5	18.5	10.0
Palomeu ♀♀	42.1, —, 40.3	65.2, —, 64.6	53.2, —, 49.4	13.0, —, 12.7	9.6, —, 11.0	32.1, —, 33.7	24.0, —, 24.5	18.5, —, 18.9	9.4, —, 9.9
Venezuela									
Cunucunumá ♂♂	39.0 (37.3–40.6) 5	63.8 (61.9–65.7) 5	50.1 (48.8–51.2) 5	—	4.7 (4.2–5.2) 5	32.9 (30.8–35.7) 4	22.9 (21.5–24.2) 5	17.1 (16.3–17.9) 4	9.3 (8.6–9.8) 5
Duida, Mt. ♂	40.3	67.0	50.0	—	—	32.8	24.0	18.2	9.8
Mavaca, Río ♂	39.2	67.6	49.7	—	—	32.4	22.5	16.8	9.0
San Juan ♂♂	39.3 (37.8–41.3) 7	66.5 (65.3–68.1) 7	50.4 (49.0–52.9) 7	—	—	32.9 (31.1–34.9) 7	23.5 (22.3–25.5) 7	18.2 (16.9–19.3) 7	9.6 (9.2–10.3) 7
Caurima, Caño ♀	38.0	64.5	49.1	—	—	33.1	24.1	—	10.0
Cunucunumá ♀♀	37.4 (30.3–39.9) 7	65.2 (63.4–67.1) 7	49.7 (48.5–51.5) 7	—	—	32.4 (31.2–33.3) 7	23.0 (22.2–23.8) 7	17.6 (16.8–18.2) 7	9.5 (9.0–9.8) 7
Mavaca, Río ♀♀	40.2 (38.6–41.0) 4	64.7 (63.5–66.2) 4	48.8 (47.8–49.7) 4	—	—	32.7 (31.0–33.8) 4	22.3 (21.4–24.1) 4	17.1 (16.2–18.4) 4	9.2 (8.4–9.8) 4
San Juan ♀♀	38.9 (36.5–41.2) 8	65.6 (63.7–67.9) 8	49.9 (48.7–51.9) 7	—	—	31.8 (30.5–33.6) 8	22.4 (21.2–23.1) 8	17.4 (16.5–18.4) 8	9.3 (9.0–9.8) 8

TABLE 6. *Continued.*

Locality	I ² -P ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar height	Symphysal angle
Guyana						
Kuitaro River ♂♂	12.5, 12.1	—, 32.3	24.7, 24.5	56.3, 58.5	38.5, 42.4	58, —
Essequibo River ♀♀	—, 11.6	—, 31.0	—, 24.7	55.0, 54.4	43.3, 38.9	50, 60
Kuitaro River ♀♀	—, 12.2	—, 30.2	25.2, 24.8	—, 53.8	—, 38.5	58
Suriname						
Kaiserberg ♂	11.9	—	25.1	59.5	43.0	47
Loksie Hattie ♂♂	12.2, 11.1	33.2, 31.8	24.9, 24.1	57.9, 58.6	47.0, 41.1	49, 55
Palomeu ♂	—	—	24.7	58.3	44.4	51
West River ♂♂	11.8, 12.0	32.1, 32.1	24.0, 23.5	56.2, 56.3	41.0, 42.2	52, 56
Kaiserberg ♀	12.5	30.9	24.1	—	—	—
Palomeu ♀♀	10.5, —, 11.0	30.4, —, 32.0	24.7, —, 23.3	52.5, —, 55.6	37.0, —, 40.0	55, —, 56
Venezuela						
Cunucunumá ♂♂	11.8 (10.9–12.5) 4	29.2 (27.6–30.3) 4	23.0 (21.0–24.0) 5	55.5 (52.5–57.6) 4	39.9 (36.7–43.1) 4	—, 57, 52, 42
Duida, Mt. ♂	11.9	29.9	22.9	55.3	40.0	53
Mavaca, Río ♂	11.2	28.5	23.3	51.9	36.2	50
San Juan ♂♂	11.5 (10.6–13.0) 7	28.7 (29.9–31.9) 7	23.8 (22.6–25.0) 7	52.5 (49.4–56.5) 7	39.0 (33.1–42.1) 7	51 (48–54) 7
Caurima, Caño ♀	11.9	28.0	23.5	49.7	33.6	50
Cunucunumá ♀♀	11.6 (11.0–12.3) 7	28.5 (27.4–29.6) 7	23.7 (23.5–23.9) 7	51.6 (48.7–53.1) 7	35.9 (34.3–37.6) 7	54 (50–60) 5
Mavaca, Río ♀♀	11.6 (11.0–12.4) 4	28.9 (27.4–30.2) 4	23.3 (22.1–24.6) 4	52.1 (50.6–53.8) 4	37.5 (35.4–40.0) 4	49 (45–52) 4
San Juan ♀♀	11.3 (10.4–11.9) 7	28.1 (25.1–31.6) 7	22.7 (21.3–25.2) 8	52.1 (49.4–56.3) 8	36.3 (33.3–40.1) 8	51 (42–56) 8

TABLE 7. *Chiropotes satanas utahicki*, new subspecies (measurements in mm).

Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condylobasal length	Zygomatic breadth	Biorbital breadth	
Brazil									
Pedral ♂♂	405, 420	380, 380	113, 115	—, —	91.4, —	74.5, 74.6	60.0, 63.0	45.0, 47.8	
Recreio ♂♂	365, 399	410, 400	110, 120	—, —	—, 89.7	—, 73.2	56.9, 58.8	43.9, 45.2	
Tapara ♂♂	370, 380*	370, 385	110, 115	—, —	87.1, 86.4	68.2, 69.6	58.4, 57.6	43.9, 44.1	
Pedral ♀♀	370, 368, 370	425, 414, 400	127, 121, 118	—, —, —	84.8, 85.1, 84.8	65.3, 65.5, 67.2	53.3, 53.2, 56.0	42.0, 43.5, 44.3	
Recreio ♀	359	368	110	—	85.0	64.8	51.2	41.5	
Tapara ♀	370	390	110	—	83.7	66.7	54.6	42.9	
Gorotire ♀	358	575	105	26	80.5	61.9	47.6	39.7	
Portel of	—	—	—	—	92.6	76.5	62.9	47.2	
Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹ -M ³
Brazil									
Pedral ♂♂	37.8, 40.3	68.3, —	49.0, 47.2	13.6, 14.7	11.4, 10.5	33.4, 33.6	23.9, 24.7	17.8, 18.9	9.6, 10.2
Recreio ♂♂	39.4, 39.3	61.3, 65.9	48.2, 50.6	—, 13.2	10.2, 8.3	—, 34.1	25.4, 23.5	17.5, 17.2	9.9, 9.4
Tapara ♂♂	39.1, 38.0*	66.0, 64.1	48.2, 46.6	13.9, 11.6	10.8, 9.8	31.8, 32.8	22.7, 24.3	16.9, 17.8	9.0, 9.8
Pedral ♀♀	37.5, 39.5, 39.3	63.5, 65.0, 64.2	49.9, 48.5, 47.7	13.5, 12.6, 13.3	9.3, 12.7, 9.1	29.6, 31.8, 31.7	23.0, 23.0, 23.2	17.4, 17.0, 17.8	9.3, 8.9, 9.6
Recreio ♀	35.5	65.5	50.4	11.0	9.2	31.3	21.8	16.5	9.3
Tapara ♀	39.9	64.0	48.0	10.6	9.3	30.6	23.0	17.3	8.8
Gorotire ♀	35.6	61.0	46.0	10.8	8.2	29.2	21.4	16.8	9.0
Portel of	41.1	70.2	52.0	14.6	13.2	35.1	25.9	18.8	11.3
Locality	I ² -I ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar height	Symphyseal angle			
Brazil									
Pedral ♂♂	11.8, 11.7	32.0, 31.1	25.2, 25.4	56.7, 58.0	40.0, 41.9	54, 55			
Recreio ♂♂	—, 10.9	31.0, 32.2	24.4, 23.7	55.4, 56.9	36.5, 41.0	54, 50			
Tapara ♂♂	11.0, 10.8*	28.7, 29.0	22.0, 23.4	52.5, 54.5	34.3, 39.5	56, 54			
Pedral ♀♀	11.4, 12.3, 10.6	27.3, 28.7, 28.2	22.6, 22.2, 22.5	50.2, 50.0, 51.9	36.1, 35.5, 39.7	54, 55, 52			
Recreio ♀	10.8	25.8	21.7	48.9	32.1	65			
Tapara ♀	10.7	26.9	22.3	50.5	33.9	60			
Gorotire ♀	10.0	26.0	21.4	46.8	29.5	58			
Portel of	—	34.8	25.5	61.0	43.5	61			

* Holotype of *Chiropotes satanas utahicki*. † See page 20 for discussion.

TABLE 8. *Chiropotes satanas satanas* Hoffmannsegg (measurements in mm).

Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condylbasal length	Zygomatic breadth	Biorbital breadth	
Brazil									
Capim ♂♂	410, 424	390, 365	—, 113	33, 30	86.8, 88.6	71.1, 72.8	57.5, 60.4	45.0, 47.2	
I. Pedral ♂	410	359	102	31	87.9	69.7	59.8	46.0	
Nova Timboteua ♂	380	380	—	—	89.2	70.0	58.7	49.0	
Km 307, Belém-Brasília ♂	400	420	120	32	92.4	73.7	60.1	47.9	
Anhangá ♀	370	390	110	25	83.9	65.9	54.4	44.3	
Benevides ♀	335	380	—	28	80.5	63.2	53.4	42.5	
Capim ♀♀	375, 375, 380	410, 400, 355	115, 110, 110	30, 30, 30	84.5, 83.3, 84.1	64.8, 65.0, 67.0	52.1, 52.6, 54.1	41.9, 42.5, 43.6	
I. Pedral ♀	388	394	—	—	87.6	68.7	54.7	44.5	
Km 307, Belém-Brasília ♀	360, 380, 380, 370	370, 410, 380, 410	117, 115, 120, 115	30, 25, 32, 30	84.9, 84.9, 86.0, 88.5	67.6, 68.1, 67.8, 69.0	—, —, 56.2, 56.8	43.3, 44.4, 45.2, 46.2	
Capim o	—	—	—	—	86.8	67.8	52.9	42.9	
Brazil									
Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹⁻³
Capim ♂♂	38.0, 39.0	64.8, 64.9	47.3, 49.6	—, —	—, —	32.7, 33.3	24.3, 23.8	18.0, 17.4	9.7, 9.7
I. Pedral ♂	39.5	65.6	49.7	—	—	33.3	23.1	17.1	—
Nova Timboteua ♂	41.5	68.0	49.1	—	—	32.2	23.8	17.1	9.4
Km 307, Belém-Brasília ♂	39.8	69.7	50.2	11.7	11.2	33.0	23.2	17.4	9.6
Anhangá ♀	38.9	62.9	47.8	—	—	31.8	22.7	17.9	—
Benevides ♀	37.5	62.4	—	11.5	8.0	30.6	22.8	17.3	9.5
Capim ♀♀	37.8, 38.2, 38.7	65.0, 63.3, 63.8	47.7, 50.2, 49.9	—, —, —	—, —, —	—, 31.2, 30.5	22.7, 23.1, 22.2	17.4, 17.8, 17.1	9.4, 9.4, 9.4
I. Pedral ♀	38.8	66.6	49.5	—	—	31.8	22.2	16.8	—
Km 307, Belém-Brasília ♀♀	39.3, 38.6, 38.7, 40.3	65.2, 64.8, 67.3, 68.8	48.7, 47.7, 47.5, 49.8	—, 10.7, 8.5, 8.8	—, 8.9, 8.5, 7.3	31.9, 32.1, 32.4, 31.5	23.3, 23.6, 24.3, 22.5	18.0, 18.3, 18.7, 17.5	—, 9.9, 10.2, 9.2
Capim o	39.1	66.1	49.4	—	—	33.2	25.0	19.2	10.0

TABLE 8. Continued.

Locality	I ² -I ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar height	Symphyseal angle
Brazil						
Capim ♂♂	—, —	29.0, 30.5	—, —	54.7, 55.3	40.5, 40.3	44, 53
I. Pedral ♂	—	29.0	—	54.4	39.6	56
Nova Timboteua ♂	11.8	29.6	23.9	53.9	39.3	63
Km 307, Belém-Brasília ♂	11.5	30.6	24.9	58.0	39.5	48
Anhangá ♀	—	28.4	—	—	33.9	50
Benevides ♀	10.2	26.4	22.6	48.7	34.5	54
Capim ♀♀	—, —, —	25.7, 26.6, 26.8	—, —, —	49.4, 49.1, 51.0	31.3, 32.7, 33.1	54, 46, 50
I. Pedral ♀	—, —	—	—	—	—	—
Km 307, Belém-Brasília ♀♀	—, 11.7, 11.0, 11.0	30.4, 30.0, 29.1, 27.5	—, 24.2, 22.5, 23.1	52.0, 52.8, 52.4, 52.0	37.2, 33.7, 37.8, 37.7	41, 51, 46, 54
Capim o	—	28.6	—	52.0	33.5	49

TABLE 9. *Chiropotes albinasus* I. Geoffroy and Deville (measurements in mm).

Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condylabasal length	Zygomatic breadth	Biorbital breadth
Brazil								
Amorim, Igarapé ♂	421	432	136	—	97.1	78.7	63.6	47.8
Aruani ♂♂	460, 455	360, 380	115, 110	—, —	93.6, 92.2	74.2, 75.7	58.9, 61.7	48.5, 47.7
Andirá, Lago ♂	—	—	—	—	95.9	80.3	64.3	50.7
Barão Melgaço ♂*	430, 470	400, 380	135, 130	—	90.0, 91.6	71.1, 73.7	—, 60.5	45.5, 46.6
Jamanchim, Rio ♂♂	—, —	—, —	—, —	—, —	91.1, 94.2	70.8, 74.9	54.0, 60.5	46.2, 49.1
Monte Cristo ♂	390	470	—	28	92.7	72.5	60.7	50.6
Parintins, Serra de ♂♂	412, 425	450, 420	—, 130	—, —	91.6, 96.4	72.5, 78.9	58.7, 66.2	48.6, 50.7
Prainha ♂	420	420	130	30	95.0	75.0	60.5	48.5

TABLE 9. Continued.

Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ¹	C-M ¹	PM ² -PM ¹	M ¹ -3
Brazil									
Amorim, Igarapé ♂	38.2	68.8	50.2	15.5	9.6	36.4	25.5	18.5	10.9
Aruani ♂♂	41.0, 39.7	68.0, 64.9	51.4, 50.5	—, —	—, —	36.0, 36.4	27.5, 26.9	20.4, 19.9	11.0, 10.5
Andará, Lago ♂	40.9	71.5	52.4	13.7	13.9	35.4	25.2	18.3	10.0
Barão Melgaço ♂*	39.6, 39.4	65.6, 67.9	49.9, 51.9	13.7, —	9.1, 10.1	33.2, 35.2	23.8, 25.2	16.7, 18.8	9.4, 10.1
Jamanchim, Rio ♂♂	40.6, 40.3	68.8, 70.0	49.5, 50.4	—, —	—, —	34.6, 35.9	25.0, 25.1	19.1, 19.5	—, —
Monte Cristo ♂	40.5	68.5	47.9	—	—	34.7	25.0	18.7	9.9
Parintins, Serra de ♂♂	39.2, 40.1	66.3, 68.1	51.4, 50.4	15.6, 18.6	8.8, 11.4	34.9, 36.5	26.3, 25.4	18.4, 18.8	9.9, 10.5
Prairinha ♂	41.3	67.4	50.1	—	—	36.3	27.1	19.8	10.3
Locality	I ² -I ²	C ¹ -C ¹	M ¹ -M ¹	Mandible length	Condylar height	Symphyseal angle			
Brazil									
Amorim, Igarapé ♂	—	34.2	24.8	61.6	39.8	65			
Aruani ♂♂	—, —	—, —	—, —	56.6, 58.5	41.5, 41.1	50, 57			
Andará, Lago ♂	12.5	32.1	25.8	62.0	45.4	55			
Barão Melgaço ♂*	11.2, 12.5	30.1, 31.3	24.7, 25.0	54.0, 57.0	35.0, 40.5	61, —			
Jamanchim, Rio ♂♂	—, —	30.6, —	—, —	54.0, 58.6	39.8, 47.0	48, 45			
Monte Cristo ♂	—	—	—	57.1	40.6	57			
Parintins, Serra de ♂♂	13.0, 12.4	31.8, —	25.3, 24.7	54.5, 60.8	41.2, 46.9	58, 46			
Prairinha ♂	—	34.4	—	59.3	44.8	49			
Locality	Head and body	Tail	Hind foot	Ear	Greatest skull length	Condylolbasal length	Zygomatic breadth	Biorbital breadth	
Brazil									
Amorim, Igarapé ♀	360	420	140	—	92.7	74.4	61.5	49.5	
Aruani ♀♀	445, 515	390, 405	115, 115	—, —	92.2, 96.3	71.8, 77.6	55.4, 59.9	46.6, 48.6	
Bravo, Igarapé ♀	370	480	136	—	96.3	76.4	60.5	49.4	
Cachimbo ♀♀	400, —	400, —	125, —	23, —	89.2, 92.8	71.4, 73.4	59.3, 60.9	47.0, 48.8	
Calama ♀	—	—	—	—	—	—	62.0	49.9	
Caxiricatuba ♀♀	440, 392	355, 418	100, 128	—, —	90.1, 90.3	69.5, 71.3	56.1, 57.2	47.2, 45.6	
Fordlândia ♀	375	420	130	—	86.1	66.3	55.6	46.2	
Ipiri, Rio ♀	382	416	125	33	87.5	69.5	57.7	47.5	
Limoal ♀	428	429	128	—	92.7	74.3	59.7	47.6	
Piquiatuba ♀	405	405	112	—	90.2	68.3	55.8	45.9	
Parintins, Serra de ♀♀	430	440	135	—	96.6	75.9	60.0	49.0	
Sainauma ♀	511	457	107	—	95.0	74.3	57.4	46.2	
Tapaiuna ♀♀	410, 403, 421	410, 417, 360	130, 120, 130	—, —, —	87.1, 89.3, 93.6	68.0, 70.0, 75.0	54.7, 54.1, —	45.3, 45.5, 48.5	

TABLE 9. Continued.

Locality	Postorbital constriction	Braincase length	Braincase width	Nasal length (medial)	Nasal width (greatest)	I-M ³	C-M ³	PM ² -M ³	M ¹ -M ³
Brazil									
Amorin, Igarapé ♀	41.5	67.0	50.9	14.7	9.0	35.3	24.0	18.0	10.0
Aruani ♀♀	39.3, 41.6	67.6, 71.5	49.8, 49.1	—, —	—, —	34.4, 35.5	25.8, 26.5	19.7, 19.6	10.3, 10.5
Bravo, Igarapé ♀	41.5	70.3	50.3	15.2	9.9	37.5	26.1	19.1	10.2
Cachimbo ♀♀	39.0, 40.8	66.0, 68.7	50.4, 50.0	—, —	—, —	33.8, 35.0	24.4, 24.7	18.7, 18.9	9.8, 9.7
Calama ♀	41.7	—	—	16.2	10.2	36.3	26.0	18.5	9.7
Caxiricatuba ♀♀	39.2, 38.6	68.1, 65.8	48.8, 47.8	—, —	—, —	33.4, 34.8	24.1, 25.0	18.8, 19.4	9.6, 10.3
Fordlândia ♀	38.9	64.0	48.9	—	—	32.8	23.9	18.7	9.8
Iiriri, Rio ♀	40.8	65.1	50.2	—	—	33.6	24.8	19.0	—
Limoal ♀	39.9	66.7	49.9	14.1	8.8	36.0	24.8	18.7	10.0
Piquiatuba ♀	38.6	67.4	50.8	—	—	33.0	23.7	18.4	9.6
Parintins, Serra de ♀♀	41.0	71.3	51.8	14.6	10.4	36.6	26.0	18.8	10.0
Sainauma ♀	40.8	69.6	52.5	—	—	35.7	25.9	20.3	10.5
Tapaiuna ♀♀	38.1, 38.4, 39.3	64.7, 69.5, 69.0	50.0, 50.5, 50.5	15.8, 10.1, 14.2	8.2, 7.8, 12.1	32.7, 33.2, 35.8	24.8, 23.9, 26.0	19.1, 18.7, 19.6	9.7, 9.8, 10.2
Brazil									
Amorin, Igarapé ♀	12.5	31.9	25.0	57.5	39.1	48			
Aruani ♀♀	—, —	29.9	33.0	54.9, 59.4	35.4, 42.1	58, 50			
Bravo, Igarapé ♀	13.3	32.1	25.6	59.5	37.8	58			
Cachimbo ♀♀	—, —	29.9, 31.3	—, —	55.5, 57.5	39.0, 38.5	53, 46			
Calama ♀	12.3	32.7	25.2	59.7	45.1	65			
Caxiricatuba ♀♀	—, —	28.2, 29.2	—, —	52.9, 55.0	37.0, 37.8	38, 46			
Fordlândia ♀	—, 27.6	27.6	—	51.0	35.1	57			
Iiriri, Rio ♀	—	30.5	—	53.8	41.0	51			
Limoal ♀	11.8	32.5	24.3	58.4	44.3	52			
Piquiatuba ♀	—	29.6	—	52.9	38.6	46			
Parintins, Serra de ♀♀	13.0	32.6	24.4	58.0	38.8	53			
Sainauma ♀	—	32.4	—	57.3	39.0	50			
Tapaiuna ♀♀	12.1, 12.7, 12.1	—, —, —	23.8, 25.0, 26.4	50.9, 52.1, 57.5	35.7, 35.8, 40.5	52, 58, 52			

* *Cacajao roosevelti* J. A. Allen, paratype and holotype in order given.

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